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In This Issue—Interview with Henry Ford

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AUTOMOTIVE INDUSTRIES
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VOL. XLVII NEW YORK—THURSDAY, OCTOBER 19, 1922 No. 16

Ford Tells What He Hopes to Do With Muscle Shoals

In exclusive interview with AUTOMOTIVE INDUSTRIES he outlines plans for great power project. Says he hasn't begun fight against opposition. Will make no additional tractor models. Does not intend to buy more factories, cars or railroads. Plans Russian plant.

By James Dalton

HENRY FORD discusses for the first time in this interview his plans for the development of the power resources of Muscle Shoals. He says he will use all the power himself, but that he does not know in just what way. He expects to employ one man for every horsepower developed and there are nearly 1,000,000 hp. in sight.

Ford says also that he "hasn't heard" of a new Ford car; that he can't make enough of the present model; that he will use no more aluminum until he makes it himself; that he will build no new tractor models; that he will take over no more automobile factories; that the one railroad he has is enough.

Ford will devote much of his attention in future to the development of water power projects in various sections of the country.

"WE'RE manufacturers. We must have power and we have never had enough. We have to work around the clock to get it by putting more men to work in the middle of the night, which is no time to work."

This is the simple explanation Henry Ford has given AUTOMOTIVE INDUSTRIES of why he wants to develop the gigantic hydro-electric resources of Muscle Shoals. It probably was the foundation upon which he based his bid to the Government for its rights in the "Niagara of the South." But since his now historic proposition was made, his plans have matured in his own mind, and he is thinking almost as much of what a great industrial development will mean to the South as of his own profits.

When Ford was asked, however, what were his plans for Muscle Shoals he pondered for a moment, then shook his head and responded:

"I don't know.

"We may use all the power to make fertilizer," he added. "We may use most of it for manufacturing or we may use it to develop natural resources and make steel or aluminum. We can't tell what we will do until we get at it, but we're going to use that power."

It is significant of Ford's determination that when he discusses Muscle Shoals, he does not say "if we get it" but "when we get it."

When asked the direct question, "What hope have you of being permitted to develop this project?" he responded:

"We haven't begun to fight for it yet. It hasn't reached the floor of Congress. All that we have done so far has been to send our Chief Engineer, Mr. Mayo, down to Washington chiefly to answer questions which may be asked about our offer. He was simply a dictionary and encyclopedia in engineering for the benefit of the committees.

"When the right time comes we'll show up the opposition. We're going to do that whether we get it or not. Up to this time we haven't tried to do anything except answer questions and explain our offer."

Source of Muscle Shoals Opposition

Ford attributes the opposition to his offer to what he terms "the international Jews." He believes these figures are responsible for the battle waged against him by the fertilizer, aluminum and power interests, including the "Chilean nitrate crowd." He has been informed by his friends in Washington that they have been amazed at the ramifications of this opposition which has brought together representatives of interests heretofore not supposed to have had anything in common.

He believes that the great banks and other powerful combinations are controlled by the same people. The names of the individuals in this group may change as the years pass, but the interests they represent always are the same, he contends. He is convinced that water power interests all over the country are in league to gobble up all possible sources of power for their own purposes.

"Sometimes they don't develop the power," Ford said, "and sometimes they use politics to sell more power to cities and villages for street lighting, for instance, than there is any sense in using. Sometimes they put it over by having two or three of their representatives elected to the common councils.

"If we haven't done anything else, we have shown what Muscle Shoals are worth and we have kept these other people from getting them for nothing. The idea of developing them was peddled around to all kinds of manufacturers and none of them would look at it."

Ford chuckled as he told of the way in which the project was first brought to his attention by General Beach of the Army engineers from whom a wire was received one day, asking if he would be interested in this great source of water power.

"When they came to me with the message," he said, "I asked them 'what are they and where are they?' I knew that Muscle Shoals were somewhere in the Tennessee River. I didn't even know in what part of Alabama but Mr. Edison tells us there are possibilities in everything and that we ought not to overlook any of them, so I told them to say that we were interested, and that's the way we came to get into it.

"I wish the Ford plant was down there now," he added rather whimsically, "for then we would not have to worry about coal." He hastened to explain, however, that Detroit is a splendid manufacturing center because it is located midway between sources of supply.

No Surplus Power

It was evident that Mr. Ford has not ceased to concern himself with the coal question because of the academic interest he displayed in the procession of loaded coal trains moving past the old tractor plant at Dearborn, which now is used chiefly as a laboratory and at which he spends most of his time.

"That one's going west," he remarked, after a puffing engine had made conversation momentarily impossible. The interview, in fact, was punctuated by coal trains.

"What will you do with the surplus power developed at Muscle Shoals?" Mr. Ford was asked.

"There won't be any surplus," he responded. "We're going to use all of it doing something useful. It will require only about 100,000 hp. to turn out the 110,000 tons of fertilizer the contract calls for every year. The total in sight figures out 890,000 hp. so that there is plenty left for work—it may be more fertilizer, it may be manufacturing. But unless you have looked into it you can't realize what a big proposition fertilizer is, and how many millions of dollars are taken out of the farmer every year. We want to do something big for the farmer. He has it coming to him."

Mr. Ford has been quoted as saying that one man should be employed for every horse power developed and he was asked if this were true.

"That's the way it figures out," he replied. "We have 50,000 hp. at Highland Park and employ 50,000 men."

"Do you mean, then, that if you get, say 200,000 hp. at Muscle Shoals you would use 200,000 men?"

"Yes, and that means five times as many people down there," was the answer.

This means that if Ford is permitted to expand all the ideas he has in the back of his head for Muscle Shoals, the vision the people of Alabama see of a great industrial city on the banks of the Tennessee, which will rival Detroit, will become a reality.

The attention of Mr. Ford was called to the real estate exploitation which already has been undertaken in the vicinity of Sheffield, Tuscumbia and Florence. He did not seem to regard it very seriously, remarking that real estate promoters usually are so far ahead of their time that they get trapped at their own game. It is evident that he expects no trouble in getting all the help he would need in Alabama and that there would be no serious housing difficulties.

Aluminum Possibilities

The section around Muscle Shoals is rich in deposits of bauxite from which aluminum is obtained, and it often has been asserted that Ford contemplates the use in the future of large quantities of aluminum in his products. He was asked if this were the case.

"We shan't use any more aluminum than we're using now until we make it ourselves," he replied. "We may do that at Muscle Shoals. We don't want to develop too fast. We've had all kinds of propositions presented to us, especially by people who have timber lands to sell."

That section of the south which borders on the Tennessee River is confident that the development of Muscle Shoals by Ford would do much to bring the waterway in which they are so much interested into equal prominence with the Ohio, and it is certain that Mr. Ford has given full consideration to the possibilities of navigation on the stream, but it is evident he expects the government to do whatever is required to promote another great waterway.

"That will work out automatically," he replied to a question about navigation on the Tennessee. "It's a matter of navigation and up to the government."

That also is his position in reference to the construction of conservation dams which will be required if the full possibilities of Muscle Shoals as a source of power are to be made available throughout the year.

All kinds of railroad projects leading to Sheffield are being staked out and surveyed in the apparent expectation that it will be possible to unload them on Ford and he was asked if he expected to become the leading railroad promoter for the south.

"We've got one railroad now, and that's all we want," was his answer. It was apparent that he had in mind recent persistent reports that he contemplated the purchase of other lines, for he added, "Why should we want to buy the Wabash?" Rumors that he will buy that line bob up periodically.

While Mr. Ford is quite willing to talk of his plans for development of the tremendous power resources of northern Alabama from a purely business standpoint, he is reluctant to discuss his ideas of what they may mean to the people of the South from a human point of view. His associates are more willing to dilate on this angle of the proposition, however. They will tell you that Mr. Ford has a deep dislike of seeming to pose as a philanthropist in this respect.

South Can Be Developed

Mr. Ford has a very deep interest in the people of the South. He doesn't believe they ever have had a real chance in a commercial way because they have lacked the capital to promote their own natural resources and have suffered from the selfish motives of promoters who have bought up lands rich in minerals or water power sites and then held them for years in expectation of unloading them at a large profit. He says himself that the South has never had a square deal.

"Southerners," he says, "are good people. They are real American citizens."

Ford believes that if he can use to the full the hydro-electric resources of Muscle Shoals he can put more joy into the lives of the people who already live in that section of the South, or those who may be attracted there by his projects, than they have ever known before. He wants them to get the full benefit of the use of electric energy in its myriad forms in their homes. He visions a time when the ordinary house will be heated by electricity and when the housewife, who is now more or less a drudge, will be doing all her cooking, baking and washing by electricity. His hopes in this respect are not confined to Muscle Shoals for he expects to acquire water power sites in other sections of the country as they become available and use them on a smaller scale to carry out the ideas he has for the South.

Henry Ford

Ford believes that the best kind of philanthropy is that which helps people to help themselves. He is honestly interested in the farmer as a human being and not entirely as a potential market for his products. That is one of the reasons he wants to go into the production of fertilizer on a large scale. He makes no bones of asserting that the prices now charged for fertilizer are little short of wicked. He realizes that the farmer cannot begin to get the best results from his land until he can replace each year, at something like a fair price, a reasonable proportion of the nitrate which is taken from the earth with every crop.

Friends of Ford in Detroit, as well as in the South, assert that he alone of the many who have considered Muscle Shoals has grasped their full possibilities from every point of view, and is confident of his ability to develop them. In this connection they give full credit to his engineers. They contend that it is not his financial resources alone which make his offer the soundest and most practical, for other interests would be overwhelmed with funds if their visions of the project were as broad as his. They assert that the international bankers, whom he abhors, always are glad to sell 4 per cent, 30-year bonds based on any sound project, and thus get a return of 120 per cent in addition to full value for their money. Ford's interests are universal in their scope but all of them are exceedingly practical. It is one of his favorite maxims that "everything should be worked out on the drawing board."

"If there is a demand for a thing there will be no trouble about merchandising it," he says. "If there isn't a real demand for it, you can't sell it for more than a little while."

Ford talked freely of Muscle Shoals which, if his offer for them is accepted, will become the greatest single source of hydro-electric energy in the United States. He was entirely honest in his assertion that he did not know exactly how he would employ their tremendous power resources. "We settle problems when we reach them," is one of his sayings. He has given much thought to the subject, but its potentialities are so gigantic that they stagger even the hardest working imagination.

If the past master of mass production, whose name is known wherever motor vehicles are operated, feels the burden of his great wealth, and he has $180,000,000 in cash, the load rests lightly upon his shoulders. It would be difficult to find a more democratic and genial individual. He did not seem to think that questions designed to elicit information about his affairs were impertinent.

There was apparent no effort at evasion, although it is true he did not elaborate in some of his replies. He usually explained, however, that he didn't know. He gave the impression that he didn't propose to commit himself too definitely on any subject with which he was not thoroughly familiar. It is an evidence of the man's simplicity that his own office, adjoining, is no more elaborate than the plain editorial sanctum of the *Dearborn Independent*, in which he was interviewed.

Interested in Water Power

Ford carries in his head a mass of information, all of which may come in handy sooner or later. The subject of Muscle Shoals brought up water power generally. There is no subject in which he is more deeply interested, or to which he will give more attention in the future.

Drifting away from the theme of Muscle Shoals, Mr. Ford was no more reticent about other subjects more directly related to the automotive industry.

He was asked, "What is the greatest thing motor manufacturers can do for their dealers?"

"Why not let the dealers do something for themselves?" was the rejoinder.

Under the circumstances it did not seem wise to press for further enlightenment as to his views on dealer helps and he was asked for his opinion on the subject of highways.

"The best way to get good roads," he avowed, "is to load trucks to their full capacity. When the roads won't stand up under these loads the people will realize they must build heavier highways to carry the traffic. One of the best ways to kill foolish opposition to spending money for better roads is for a few of the old fogies who are standing out against it to die off. This applies not only to good roads but to most forward looking projects."

As an example of high class highway construction he cited a mile of concrete in front of the Dearborn plant which stood up under the hardest possible kind of wear while some exceedingly heavy trucking was being done. Four sets of wheels on the traction engines which were used were worn out but the road did not break up, contrary to his expectation.

"Build More Roads"

Ford was asked what he expects will happen with the constant increase in the number of motor vehicles in use now that highways in some places seem to be carrying about all they'll hold.

"We'll have to build more roads," he said. "Of course there will have to be two lines, one for traffic in each direction."

Mr. Ford set at rest several frequently heard reports about projects he is said to have in mind.

"Can you tell us anything about the plans for your new car?" he was asked.

"What new car?" was the rejoinder. "I haven't heard of any. We can't build enough of the one we're making now. We're trying to get our production up to 5300 a day. We have orders for 136,000 or 156,000—or something like that—for October."

"It is reported, Mr. Ford, that you contemplate some additions to your tractor line."

"We shall make no more tractor models but will stick to the one we have," he replied. "We shall not make a larger tractor."

"Do you contemplate buying any additional plants?"

"Positively not. We've got enough to do now and are not going to buy any more cars or factories. That applies to the Wills plant and the Wills car, our purchase of which is rumored every little while. Why should we try to get any company out of the field? They all make business for us and we make business for them."

Develop Russia Later

Mr. Ford was asked what would be his next step in the foreign field.

"Maybe our next development will be in Russia," he replied. "Sooner or later we will have a plant there to make trucks, tractors and cars, but that cannot be until conditions become more settled there.

As an example of his views on the folly of pre-determining just what will be done in any plant, Mr. Ford said:

"The boys came in to me the other day with the sign for the Green Island plant which read 'Ford Motor Company—Ball and Roller Bearings.' I told them to take off the 'Ball and Roller Bearings' because we didn't know what we might make there."

To the interviewer, who frequently is harassed by the fear that he is encroaching too deeply upon the time of a busy man, Mr. Ford is a jewel. He was unhurried and serene. There was no sign of impatience. Only once in more than an hour did he look at his watch, and when I arose to go he said:

"No, no. There's no hurry. I have half an hour yet."

For many reasons a chat with Henry Ford is something to be remembered. You forget that you are talking with a man who started with nothing except an idea and has carved out a colossal fortune. He radiates good will, he has a fund of homely philosophy, a sense of humor and he inspires confidence.

Henry Ford knows what he wants. He has worked out his plans on the "drawing board."

There is a world of determination in his quietly uttered assertion in relation to Muscle Shoals:

"When the time comes we'll do our fighting, and some people will know they have been in a fight."

Research on Petroleum Products

THE American Petroleum Institute has made arrangements to conduct investigations covering, among others, the subjects listed below. In this work the Institute will be assisted by the Petroleum Section of the American Chemical Society through a committee acting in advisory capacity:

1. Preparation of more rational specifications for petroleum products, based on careful research work covering in particular items such as gasoline volatility and the oiliness of lubricants.

2. An investigation intended to determine whether certain processes now used in refining gasoline are actually necessary. These tests will seek an answer to the mooted question as to the need for removing bad smelling sulphur compounds which are supposed, but not certainly known to be, injurious to engines and other parts of the chassis.

3. A study into the fundamental causes of carbon formation in engine cylinders.

4. A research into the causes and mechanism of color changes in oils.

Among those who are to serve on an advisory committee dealing with this research program are R. E. Wilson, C. E. Waters, N. A. C. Smith and E. W. Dean.

THE new customs tariff of Ceylon which went into effect provisionally from August 25, as announced in Commerce Reports for September 4, has been adopted with certain modifications. The import duties on motor trucks remain unchanged, while the advance on automobiles and motorcycles is more moderate than had been proposed. The final rates are as follows:

Articles	Former duties Ad valorem	New duties Ad valorem
Automobiles	7½%	10%
Motorcycles	7½%	10%
Motor trucks	7½%	7½%

The duties in Ceylon apply equally to imports from all sources.

Record-Breaking Pulitzer Racers Show Advance in Plane Design

American planes break world's speed record at Detroit air meet. Winner averages 206 m.p.h. First four carry new radiator construction. Retractable type chassis prominent construction feature. Race indicates probable trends in aircraft design.

By Archibald Black

THE Pulitzer Trophy Race, held in Detroit, Mich., last Saturday, resulted in further pushing up of the world's speed records. Finishing the race at an average speed of 206 miles per hour, Lt. R. L. Maughan, U. S. Air Service, flying a special Curtiss-Army Racer, brought the speed honors to the United States. Lt. L. J. Maitland, U. S. Air Service, flying a duplicate machine, covered the course in the first lap at a speed of 216 miles per hour but lost some time in the succeeding laps, finishing slightly behind Lt. Maughan, although also breaking the former world's record. Each officer made speeds approximating 220 miles per hour on the straight stretches of the course. From the manufacturer's viewpoint, the Curtiss Company carried off all of the honors as constructors of the winning machines, the first four places in the race being taken by Curtiss airplanes.

Several of the 24 entries appearing on the official program failed to start for various reasons. It was evident early that the race was to be fought out between the Curtiss-Army, Curtiss-Navy, Booth Racer, Verville-Sperry, Navy-X, Verville-Packard and Loening. While some differences of opinion existed as to the exact order in which each would finish, it was generally thought that the Army-Curtiss would take first place, barring accident. The finish verified this opinion, the five fastest machines completing the race as shown in the accompanying table.

The outstanding features of the machines from an engineering point of view were the wing surface radiators and retractable landing gears with which several of them were equipped. The wing surface radiator has thoroughly demonstrated its worth for racing purposes, although it is of doubtful value in military and naval work because of its vulnerability.

This type of radiator, with which the first four machines to finish, as well as the Bee Line Racers, were equipped, proves use of the surface of the wings for radiation entirely practicable. While this principle is old, having been patented in France several years ago, it remained for the Curtiss Company to complete its development and put it into actual use in modern high speed machines.

The radiation is constructed by fastening together two sheets of brass, the inner one smooth and the outer one corrugated, and circulating the water between these. The brass sheets are fastened to the wings in place of the customary surfacing and water headers furnished on the leading and trailing edges. Both top and bottom surfaces of the wings are covered with the sheet radiators, while the water flows backwards on one surface and returns on the other. By the use of this system of radiation the resistance of the ordinary type of radiator is practically eliminated. Its success having been so thoroughly demonstrated in the Pulitzer race, it may be expected to become almost universal for racing purposes.

The retractable type of chassis, another novel feature used on both the Bee Line Racers and the Verville-Sperry entries, was not given a fair opportunity to settle its value. While these two types took part in the race, only one of them, a Verville-Sperry racer, made a fair showing. The others either did not start or dropped out of the race through one cause or another. The chassis of each type is somewhat similar, the wheels being drawn in towards the center of the machine and folded up into recesses in the wings.

Chassis Control Mechanism

The mechanism controlling the movement of the chassis, however, differs considerably in the two types. In each case the movement is manual and controlled from the pilot's cockpit. In the Verville-Sperry the shock absorber cords are located inside of each of the wheel hubs, these being about 9 inches in diameter. In the Bee Line Racer, the shock absorber cords are located on the outer struts and are inside of the wings. The wheels, in each case are of the wire type and in the Verville-Sperry are not covered. When the chassis is retracted, some resistance still remains because of the irregular surface and the open wire wheel on the under surface of each wing. Before the value of this type of chassis can be said to be determined, these faults in streamlining must be corrected so that the folded chassis presents substantially a smooth surface to the air.

The various machines divided into two opposite types so far as wings were concerned. Some made use of the thick wing internally braced principle, while others were frankly of the thin wing externally braced type. The first four machines to finish were of the latter type while the fifth was of the thick wing type. Offhand, this would appear to suggest that the thin wing principle was the most satisfactory for ultra-high speeds but Saturday's race was not sufficiently conclusive in this regard to finally settle the point. While we are basing our performance calculations on exact wind tunnel tests of thick and thin wings, these tests have been made at speeds of 40 to 60 miles per hour and on very small models. Now that we are flying full size machines at 200 to over 220 miles per hour it is an

Order of Finish	Entry	Airplane	Engine	Pilot	Average speed in race, m.p.h.	Fastest lap, m.p.h.
1	43	Curtiss-Army No. 1	Curtiss D-12 400 b.hp.	Lt. R. L. Maughan, U. S. Air Service	206.0	207
2	44	Curtiss-Army No. 2	Curtiss D-12 400 b.hp.	Lt. L. J. Maitland, U. S. Air Service	203.0	216
3	40	Curtiss-Navy No. 2	Curtiss CD-12 375 b.hp.	Lt. H. J. Brow, U. S. Navy	193.2	195 190
4	8	Curtiss-Navy No. 1	Curtiss CD-12 375 b.hp.	Lt. A. J. Williams, Jr., U. S. Navy	188.0	182
5	49	Verville-Sperry	Wright H-2 350 b.hp.	Lt. E. H. Barksdale, U. S. Air Service	181.0	

open question if we have any justification for this practice. The National Advisory Committee's compressed air wind tunnel, will go far towards settling this question because it will enable the making of tests under almost directly comparable conditions.

The tendency towards provision of rigid surfacing of the wings on these very high speed machines was noted to be very much on the increase. The sheet type of radiator (already termed "washboard" at the flying fields) provides a very rigid surface where it is used. Thus the two fastest machines, having had plywood covered wing tips and this type of radiator, were provided with substantially rigid wing surfacing. The Verville-Sperry which finished fifth, had wings which were covered with plywood from the leading edge back to the rear beams, about three quarters of the wing surface being thus of the rigid type.

The tendency to close the gap at the control surface hinges (ailerons, elevators, etc.) has reached the point where it is almost general practice in racing machines. In some cases this end is accomplished by the use of rubber fastened to the surface on each side of the hinge and in other cases a metal strip, fastened to its forward edge is used. It was noted, in one case, that after the race the rubber gap closing sheet on one machine had been completely ripped off, carrying its fastenings with it. The condition of the tail surfaces indicated that rubber sheet gap closing is not satisfactory.

Navy "Mystery" Machine

The Navy X machine, which was said to have been surrounded with some secrecy before its assembly at the field, was rather a surprise to those who expected to find it a very high speed racer. This machine which is of the 1¼ plane type, was equipped with the new 600 hp. Wright engine. It possessed some unusual and very interesting features but it was obviously not designed for a race such as this year's Pulitzer turned out to be. In the very high speeds attained in present airplane races increased horse power is of only secondary importance. The race is determined by resistance. This is borne out by the fact that the winning machines were equipped with 400 hp. engines while other contestants which did not even approach their speeds had fifty per cent more power. The Navy X with its 600 hp. made only about 186 miles per hour as against the 216 miles per hour clip of a 400 hp. Curtiss Army racer in one of its rounds of the course. Study of the Navy X suggests that the 186 m.p.h. speed is probably within 5 or 10 miles per hour of its maximum. Equipped with two Lamblin radiators, a rather bulky wheel streamline, numerous struts and wires this machine made a strange comparison with the others which were conspicuously free from these. The wheels of the Navy X machine are carried on rocking arm constructions built of steel tube, the short axle being carried by the forward part of this frame while the shock absorbers are carried by the rear. The whole is covered with a very large streamline and my personal impression was that the resistance of the landing gear considerably exceeded that of the more conventional Curtiss-Army racer. In general arrangement of this machine, the forward part of the fuselage is raised above the usual proportion in height so that the angle of the wing is unusually large when tail skid is down. In addition to being used to test out the new Wright engine, the several features mentioned and some others of lesser importance which were noted, indicate that this machine was designed for chiefly experimental purposes.

Other Entries

The Loening machines while not attaining the speeds of some of the other entries, impressed the observer as having been designed solely for service purposes. It appeared possible to use them for this without any change whereas several of those making better speeds would require considerable modification which would, at the same time, detract considerably from the speeds reached in the race. As it stood, one of the Loening machines made about 170 miles per hour.

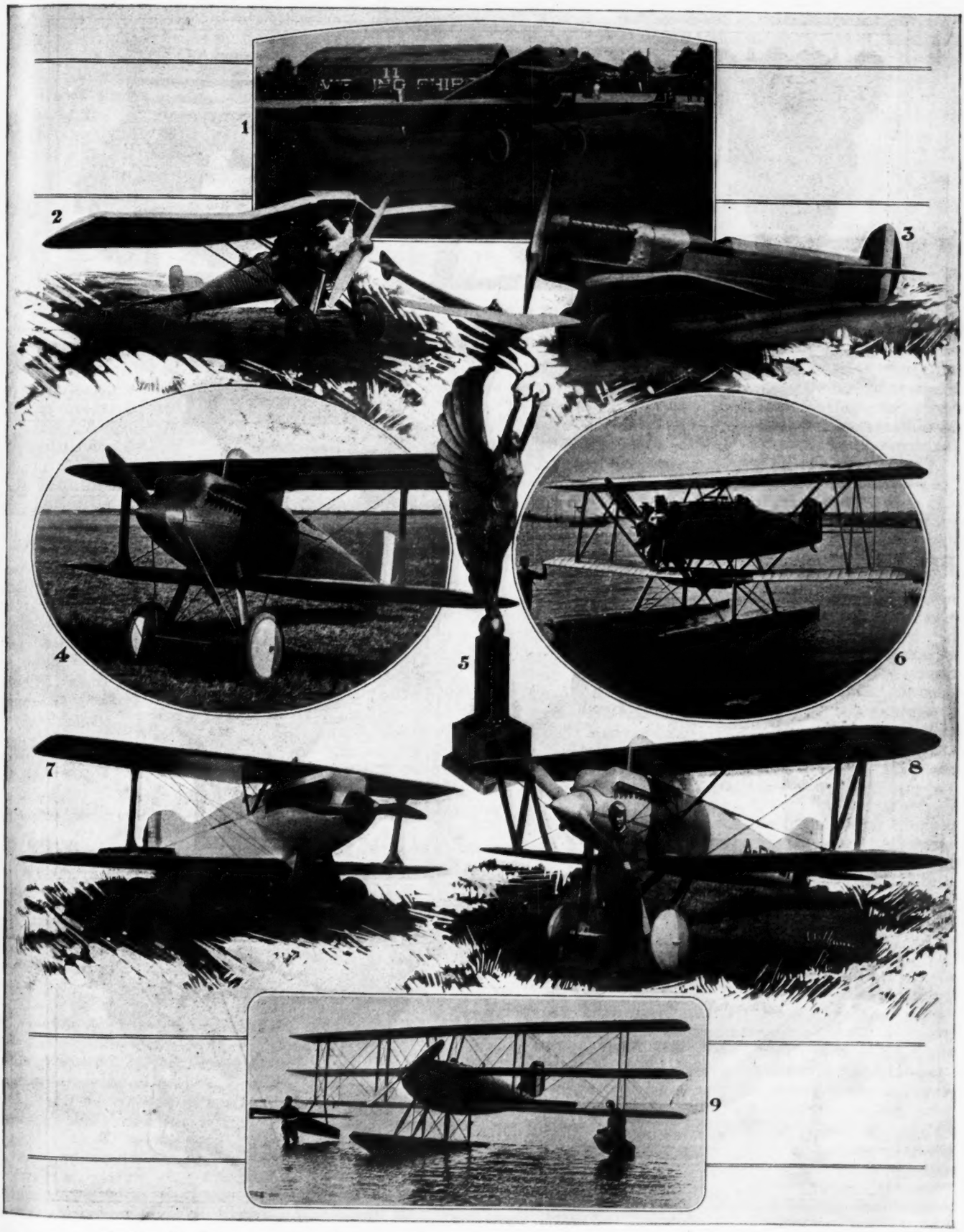
The Thomas-Morse all-metal monoplane was the most unusual entry in the race. Two of these machines, each equipped with Packard 600 hp. engines, competed, one reaching 165 miles per hour over the course. This type has a semi-internally braced wing of metal and covered with corrugated aluminum or duralumin. The fuselage is constructed of metal channels and tubes with corrugated metal surfacing and oval tube braces are carried from the fuselage to the wings. The radiator is of a very novel type but, while very ingenious, does not look as promising as some of the other types used.

The Dare variable camber monoplane did not take part in the races, the constructors having failed to furnish the technical data required by the contest committee. This machine was more or less of metal construction and had adjustable leading and trailing edges, hence the name "variable camber."

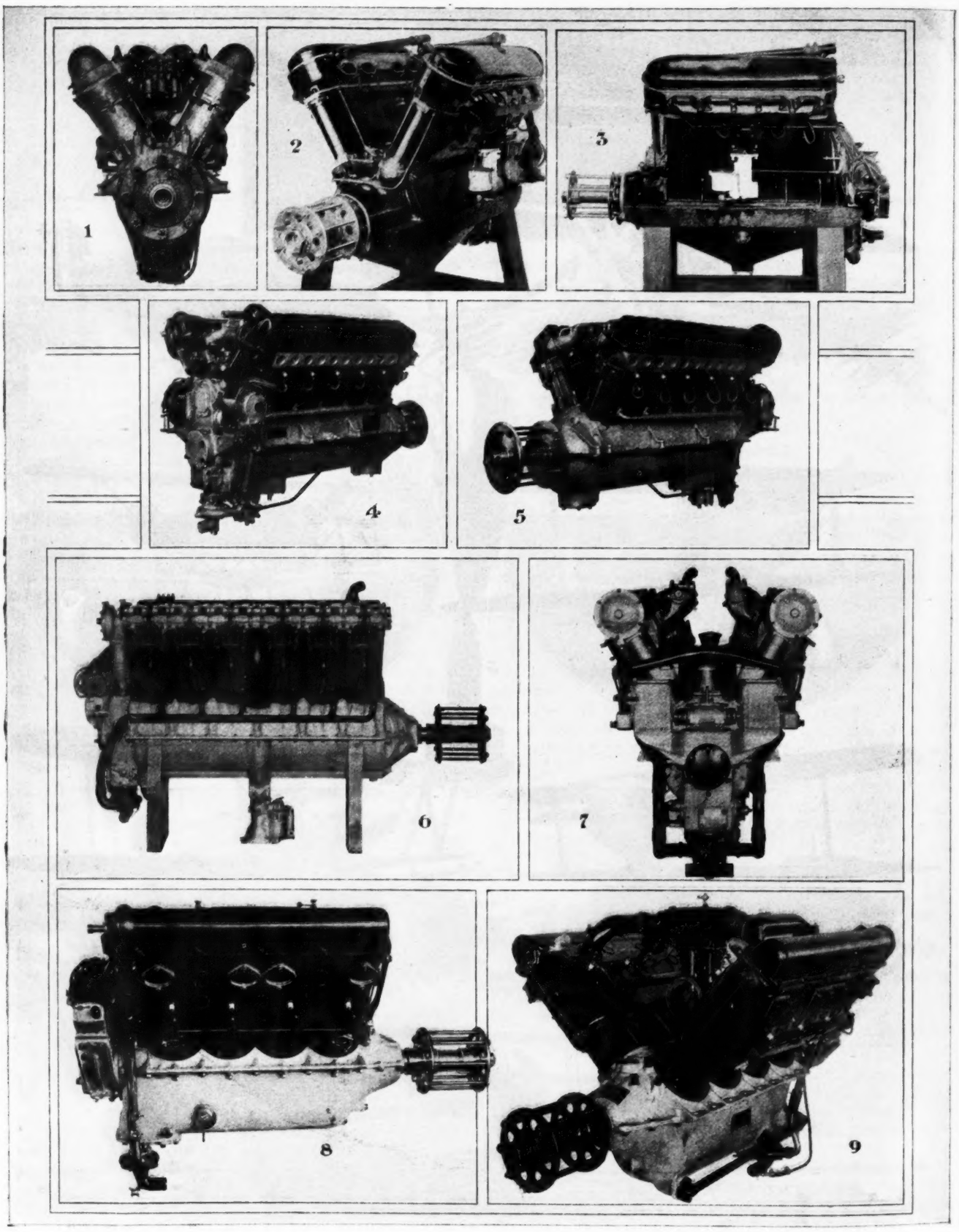
The outstanding engines in the races were the Curtiss CD-12 and D-12, the Wright H-3, E-3 and new T-2, 600 hp., the Packard 2025 the Lawrance J-1 and the Aeromarine U-873. This latter engine was the one which recently underwent a 300 hour test under supervision of the Navy Department. Practically all of these engines have been described previously and more or less completely in AUTOMOTIVE INDUSTRIES although in some cases this was the first opportunity to put them through severe service tests.

In the case of the Wright T-2 with which the Navy X machine was equipped, this was the first time that an engine of this model had been tested in the air. This engine develops about 600 hp. and is of the twelve cylinder Vee type. Cylinders are cast in blocks of three and are water cooled. Ignition is by means of two magnetos and the carburetors, following a practice which is increasing in popularity, are located below the crankcase. This engine is the latest development of the Wright Aeronautical Corporation and the actual engine installed in the machine in the race was the second of its type built. It is an

PULITZER RACE PLANES



1—The Verville-Sperry machine, three of which took part in the Pulitzer Race. 2—Thomas-Morse all metal airplane. 3—The Loening Army racer. 4—Curtiss-Army No. 1, winner of the Pulitzer Trophy Race (a similar machine took second position in this race). 5—The Pulitzer Trophy. 6—Navy TR-1, which finished second in Curtiss Merine Trophy Race. 7—The Verville-Packard, a veteran of former Pulitzer races, which took part in the recent one, the engine having been changed for the latest model of Packard. 8—Curtiss-Navy racer. Two machines of this type took third and fourth positions in the Pulitzer Trophy Race. 9—Curtiss 18-T. (This machine made the highest speed in the Curtiss Marine Trophy Race but ran out of gasoline on the last lap and did not finish the race)



1—Curtiss CD-12, 375-hp. engine as used in the machines taking third and fourth places in the Pulitzer Race. 2 and 3—Aeromarine model U-873, 200-hp. engine, as used in UO-1 Vought machine in Curtiss Marine Trophy Race. This is the model of engine which recently passed a 300-hour Navy test. 4 and 5—Curtiss D-12, 400-hp. engine, as installed in the machines taking first and second places in the Pulitzer Race. 6 and 7—Packard model 2025, 600-hp. engine, used in Loening, Thomas-Morse all-metal and Verville-Packard airplanes. 8—Wright model E-3 Alert 200-hp. engine, used in Navy TS seaplane and Vought VE-7. 9—Wright model H-3 Superfighter 400-hp. engine, used in Thomas-Morse MB-7, Bee Line Racer and Verville-Sperry Racer

entirely new development and bears no resemblance in appearance or design to the Hispano series from which the other models made by this firm were developed.

The Packard model 2025 is already well known. This is a twelve cylinder Vee type following the characteristic lines of design of the other Packard engines. Cylinders are of the individual, steel type as in the other models. This model develops as high as 650 b.hp. at 2200 r.p.m. although rated nominally at 550 b.hp. at 1800 r.p.m.

The Aeromarine U-873 is a development of this company's U-8-D model but weighing about seventy-seven pounds less although eighteen per cent larger in displacement. The principal changes were an increase of bore from 4¼ in. to 4⅝ in., some slight increases in the bearing thicknesses and inlet valve diameters. The redesigned engine is rated at 250 b.hp..

Touring Car Versus Phaeton

By George J. Mercer

THE writer, as a member of the S. A. E. Standards Committee that was responsible for the nomenclature of automobile bodies adopted by the Society of Automotive Engineers, desires to answer criticism of the change from "Touring Car" to "Phaeton," which was approved by this committee.

Due consideration was given to established practice and to the fact that the committee was setting a standard for the future as well as for the present. Consideration was given also to the origin or derivation of the names.

As proof that the committee bore the above considerations in mind, take two of the names selected, "brougham" and "cabriolet." Neither one has a derivative sense as used. There are several distinct outstanding features that are characteristic of the type of body known as the brougham in the carriage days and in the early days of the automobile, that are lacking in the automobile body the committee has selected to bear this name. At the Salon one or two genuine broughams are invariably exhibited. Yet the committee has given this name to the type shown on page K23 of the S. A. E. Handbook (copies of data sheets enclosed) because the general public had seen fit to use the name selected.

In addition, it was felt that the older or original type was not suitable in general for use as an automobile body type. We agreed, therefore, to pass nomenclature on to successors and in naming both the brougham and the cabriolet, we were actuated solely by the fact that the public commonly recognized these bodies by the terms mentioned.

One reason the committee chose the name "phaeton" was that the term "touring" applies to any particular type of body because all types are used for touring, but that was not the only reason. This type of body is the logical successor of the family horse-drawn open carriage known as the phaeton. It was so called in the earliest handbooks issued by the Association of Licensed Automobile Manufacturers. In the 1906 Handbook, Packard, Walters and Stevens-Duryea used the name "phaeton," Pierce-Arrow designated the vehicle in question as a "tonneau" and others used simply the series letters or numbers of the respective models without names. Later, as the design was changed and became a flush-side body such as we know to-day, "torpedo" was the common name in Great Britain, and was used to some extent in this country; while in France the use of the name "phaeton" was general. Packard, Franklin, Cadillac, Stevens-Duryea, Cunningham, Pope-Hartford and Thomas used the name "phaeton" in the 1913 A. L. A. M. Handbook. Hudson has been a consistent user of this term.

This certainly warranted the committee in concluding that the name "phaeton" had a logical right from a priority point of view, based solely on automobile custom, to contend with the name "touring car." Furthermore, as a name it has a wonderful background of history. It is associated with the type of carriage that people have owned and used beyond our memory. It is also applicable to the more expensive carriages that were exhibited at the horse shows.

Referring to the term "roadster" being retained, since all types of car are used on roads, we must again refer to the rules and conditions that governed our work. We gave first consideration to established procedure, and chose between the merits of the existing and to our viewpoint contending names. "Roadster" and "runabout" have been from the beginning the two most popular names for this type of body. The committee chose the first. The matter is simply one of opinion. The term "roadster" has slightly the lead in popularity in advertising and catalogs issued by passenger-car manufacturers.

As it was the task of the committee to select one name from the several in use for each of the various types of body, due consideration was given to the claims of all and the decisions were based on the basis outlined herein. We feel that our work has met with general approval.

Motorboat Nomenclature Studied

AT a meeting of the S. A. E. Motorboat Division on Sept. 28, in New York City, the importance of establishing a definite motorboat nomenclature was discussed and a subcommittee appointed to study the situation and advise as to how the work should be carried out. The subcommittee appointed consists of Irwin Chase of the Elco Company; W. J. Deed, a naval architect of New York and Leonard Ochtman, Jr., of Joseph VanBlerck, Inc. The committee will obtain information as to the current nomenclature used by the engine and boat builders as a basis for determining the scope of the committee's work.

Other subjects which the division is working on are motorboat couplings, exhaust manifold connections, tachometer drives, stuffing-boxes and propeller shafting. The work in connection with stuffing-boxes covers only those dimensions which affect interchangeability.

The division also plans to take up the consideration of interchangeability for marine hardware and other boat parts. There is a real demand for such standardization, as it is appreciated that it will decrease production costs, making it possible for boat builders and users to obtain body hardware at less cost.

Mercer Adds Six To Present Four-Cylinder Line

New chassis has same wheelbase and general characteristics as that built for several years. Changes include entirely new powerplant, stiffer frame, and new three-quarter floating axle.

By Herbert Chase

A NEW chassis with a six-cylinder engine has just been added to the line of the Mercer Motor Co. which heretofore has built only four-cylinder models. For some time past Mercer cars have been marketed chiefly for use where traffic is light and speed is desired, but the increase of traffic even on suburban and country roads has made it desirable to now add a chassis capable of a very wide speed range on high gear. The result is a car which handles well on high gear in traffic and has at the same time requisite power for high speed when conditions admit.

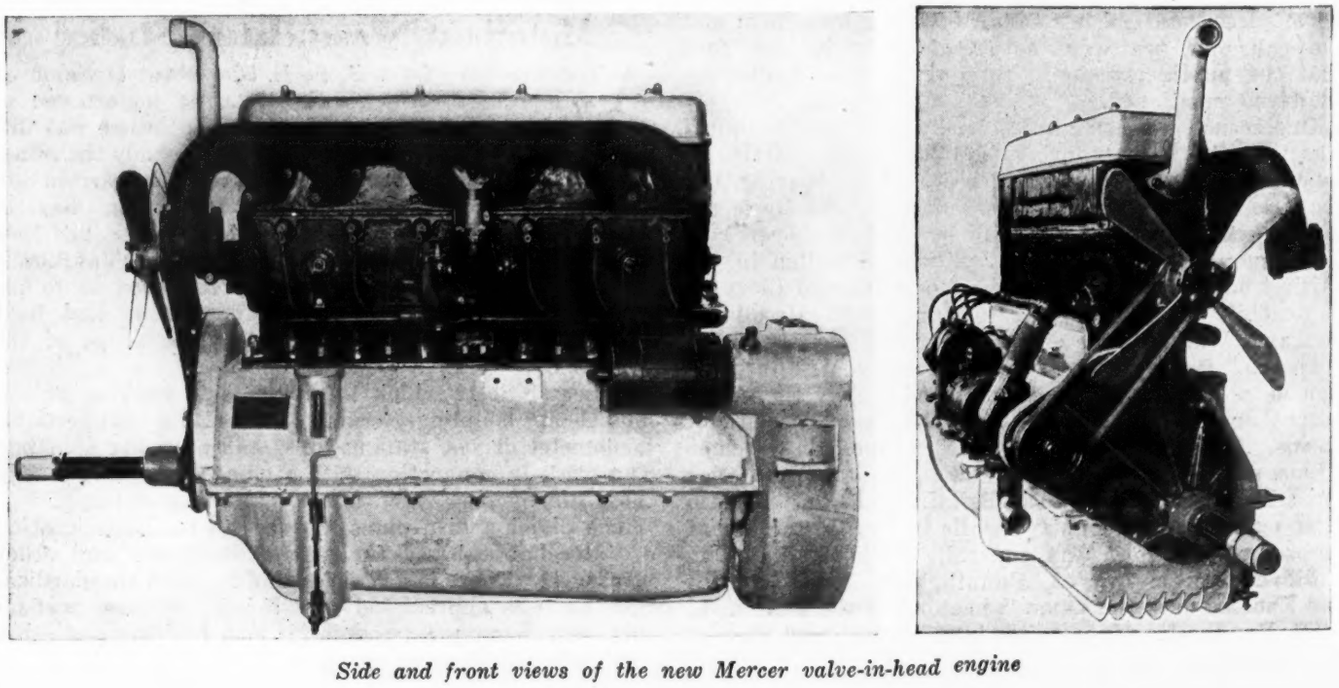
The chassis of the six is not entirely new, but most of its major units are either new or have undergone more or less change in design to accommodate them to a symmetrical whole. At the same time certain features which have been characteristic of Mercer cars, such, for example, as the propeller shaft service brake, are retained. Other unconventional parts, such as the four-speed gearset, are no longer required with an engine of six cylinders, while the use of a unit powerplant has made it desirable to employ three instead of four-point mounting.

Outside the powerplant, the chief change is the substitution of a new rear axle and the use of additional and stiffer transverse frame members made necessary by the change in engine mounting. The steering gear and front axle as well as the radiator are practically the same as those used in the four-cylinder model, except that the mounting of the last mentioned unit is on spherical instead of cylindrical trunnions.

The wheelbase of both the four and the six is 132 in.

The new engine is of the overhead valve type, with the cylinders cast in a single block from a hard gray iron. The block is narrow and has an unusually clean exterior. It is recessed to enclose the pushrods and is provided with sparkplug openings at each side, one set of which are plugged unless two plug ignition, which is not standard, is desired. The cylinder head casting is perfectly flat on its under surface. Consequently the combustion chamber has a true cylindrical form and all its surfaces are machined all over. The head is attached to the cylinder block by nickel steel studs which are less apt to stretch than studs of soft steel such as are often employed on cheaper engines. The compression ratio employed is 4.7 to 1.

It will be noted that the valves are vertical and seat directly in the head. The inlet and exhaust valves are identical and both are made of tungsten steel. The clear open-



Side and front views of the new Mercer valve-in-head engine

ing is 1 9-16 inches. Care has been taken to see that there is sufficient space between each pair of valves to avoid their seating on a common wall, thus preventing seat warpage which might otherwise occur. The upper surface of the cylinder head is provided with split bearings for clamping in place the two hollow rocker shafts. The rocker arms are quite short and are made as light as practicable in order to reduce the inertia forces. The adjustable screws which contact with the upper end of the push rods are carefully fitted and the rockers are split diagonally and provided with tangent bolts which securely lock the adjusting screw once it is properly set. The lower end of the adjusting screws are hemispherical and contact with the cup shape upper end of the push rod, the cup being kept full of oil which lubricates these parts and provides a cushion which helps to maintain a quiet mechanism. Oil is fed under pressure to the hollow rocker shafts and issues through holes drilled in the shaft and thence through passages in the rocker arms, whence it enters the cups on the upper end of the push rods and overflows running down the rods to the base chamber, lubricating the tappets and cams in so doing.

The push rods are made of steel tubing, the inserted ends being welded in place. The cam followers are mushroom type, and the cams are so shaped as to promote quiet operation.

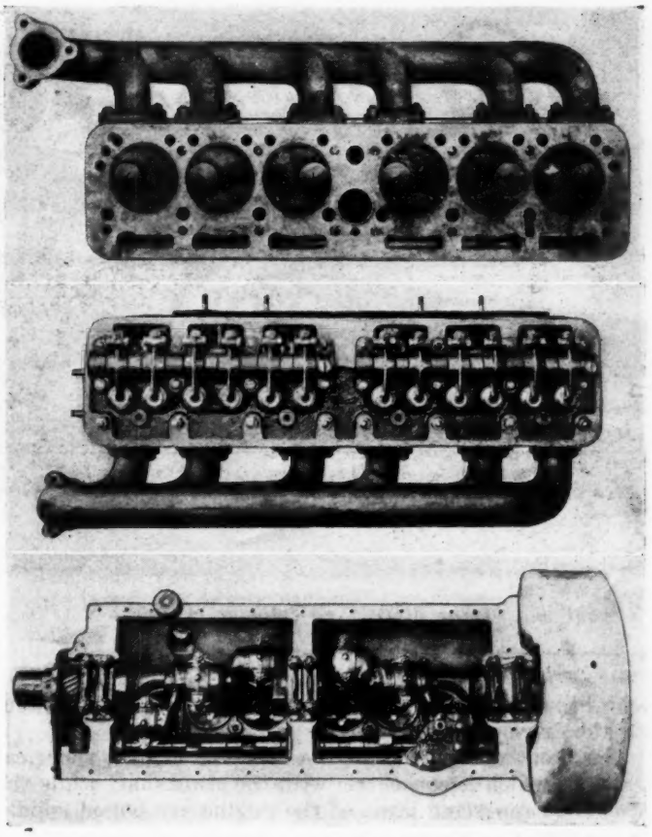
The aluminum cover used to enclose the valve mechanism is well ribbed and securely bolted to the head by eight cap screws. This insures an oil tight joint and obviates the drumming noise which sometimes occurs when a pressed metal cover is employed.

The cylinder block is bolted to an aluminum crankcase which is quite conventional in its general construction. The upper half of the case carries the main bearings while the lower half serves chiefly as an oil reservoir. The main bearing caps are of aluminum, with drop forged steel reinforcements shown clearly in one of the cuts. These bearings are bronze backed babbitt lined and measure 2½ inches in diameter. The front and center main bearings are 2½ in. and the rear main bearings 3½ in. long. The camshaft bearings are die cast babbitt and are pressed into the crankcase. The gear type oil pump is driven by a vertical shaft, its driving gear meshing directly with another gear forged integrally with the camshaft. The latter is a nickel steel forging case hardened and ground to close limits.

Helical Timing Gears Used

After exhaustive experiments it was decided to use helically cut timing gears which are said to have proven quite as quiet and more durable than other forms of drive with which experiments have been conducted. The pinions on the crankshaft and pumpshaft are steel forgings, while the intermediate gear is of Micarta. The gearcase cover is of cast iron heavily rimmed to receive the hollow plug which forms the front support for the engine. The pumpshaft, which carries the fan driving pulley on its forward end is provided with oil slingers and a coarse pitch tread which effectively prevents oil leakage. The centrifugal water pump is provided with a stainless steel shaft to insure feedom from corrosion. The lighting generator is driven off the rear end of the pump shaft while the rear end of the generator shaft is used to drive the Eisemann magneto. Special care has been taken to securely lock to the respective shafts the flexible couplings which are used to drive the units in this train. A tapered shaft end is employed at most points. The fan has four cast aluminum blades and is driven by a flat endless Gilmer belt.

The lower crankcase is provided with external ribs to assist in cooling the lubricant and to stiffen the case. The oil drain cock is provided with a long vertical stem terminating in a handle at a point above the sheeting which is inserted between the engine and frame, the arrangement being such as to make it unnecessary to reach under the chassis to drain off spent lubricant.



Above, two views of cylinder head showing arrangement and location of valves. Below, under side of crankcase of new Mercer engine

The lynite pistons are constant clearance type and are provided with three rings above the pin. No scraper ring is employed. The piston pin is of hollow tapered section and is fastened in the rod.

Connecting rods are drop forged, high carbon steel of H-section and measure 10 in. center to center. The bronze back, babbitt lined, big end bearing measures 2¼ in. in diameter by 2½ in. long. The rods are machined on the outside edges and the web is drilled to reduce weight. Two nickel steel bolts are used to secure the big end bearing.

The crankshaft has crescent shape throws, oil being fed through the shaft and around these throws by external pipes placed circumferentially in order that centrifugal force may not interfere with the flow of oil through the pipes.

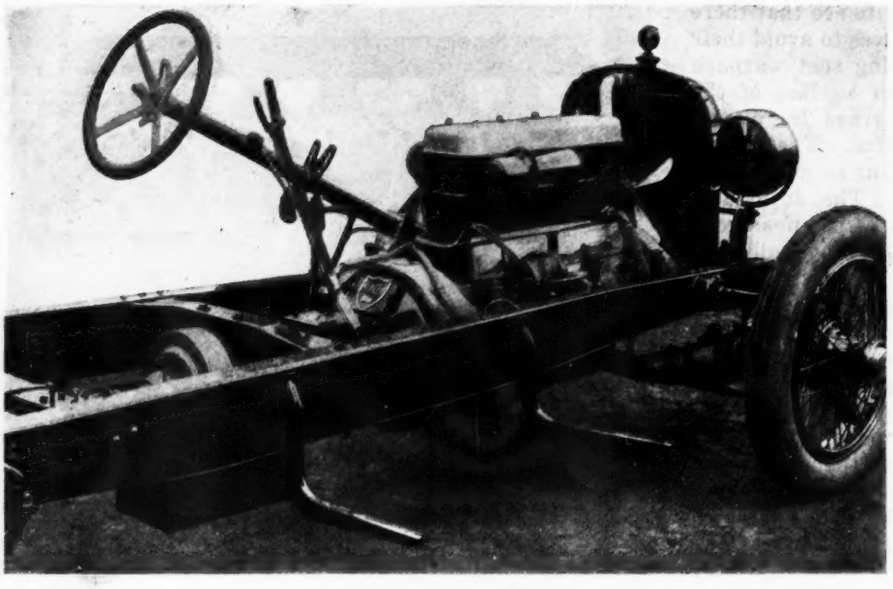
Oil pressure varies from about 5 to about 40 lb. per sq. in. as the speed increases.

The engine has 3¾ in. bore and 5 in. stroke giving a piston displacement of 331.3 cu. in. It develops its maximum of 88 to 90 horsepower at a speed between 2800 and 3000 r.p.m.

A 1½ in. Model OC 3 Stromberg carburetor of the side outlet type is employed. The air is pre-heated by contact with the exhaust manifold and the charge is afterward heated in the cylinder block by contact with the water jacketed walls and in the valve pockets where some of the walls are common between inlet and exhaust.

Fuel is fed by a G. G. vacuum tank from a large tank suspended from three points on the rear cross-member. It is fitted with a Rochester gasoline gage.

The exhaust manifold is provided with a front outlet which makes it possible to carry the exhaust pipe well



Front end of the Mercer six-cylinder chassis. Note mounting of propeller shaft brake on center cross member

below the floor of the car and prevents heat from entering the drivers compartment.

The front end of the engine is mounted in a spherical trunnion which is concentric with the crankshaft while the two rear supporting arms of the engine are bolted solidly to the frame. In this case, as with other parts bolted to the frame, rather thick shims are employed to give the desired alignment. This makes it possible to interchange engines in the same chassis without changing the drilling, and still assure correct alignment.

The new three-speed gearset, which in common with the new multiple disk clutch is of Brown-Lipe manufacture is supported on a bell housing bolted to the crankcase. The use of this gearset did not admit of a satisfactory mounting for the same propeller shaft brake which has long been a characteristic feature of Mercer cars. It was consequently decided to mount the brake as an independent unit. The bracket employed is an aluminum casting which carries the brake shaft in two ball bearings. This casting is bolted up to the center cross member of the frame and thus serves as a rigid anchorage for the brake. The brake itself is identical with that employed in the four cylinder chassis. The brake shaft is connected to the gearset by a short shaft and a flexible coupling similar to that formerly employed between engine and gearset. From the brake shaft the power is transmitted to the rear axle by a propeller shaft with two Spicer universal joints. The drive is the Hotchkiss type with the spring torque as well as pushing the car. This arrangement has long been used on Mercer cars and has proven highly satisfactory.

The new rear axle is a Columbia three-quarter floating type. It is provided with a one-piece pressed steel housing which has a single welded joint. The spiral bevel gears give a reduction of 4.08 to 1 in case of closed car axles and 3.77 to 1 in chassis fitted with open bodies. The ring gear is provided with serrations which fit into the splined differential housing and take torsional strains, so that the rivets serve only to hold the two parts together. All bearings in the rear axle are of the taper roller type. The hand operated internal expanding brakes on the rear axle are carried in flanged drums of 16 in. diameter and are completely enclosed.

Both front and rear springs are semi-elliptic and are the same length as those employed in four-cylinder chassis. The front springs are 39 in. long and the rear springs being 59 in. Both sets are 2½ in. wide. The rear springs are underslung directly beneath the side rail and are bolted to axle by U-bolts which pass around the axle housing.

An interesting feature of the spring suspension is the type of shackle employed. The side links of the shackle are forged separately and are then machined with a taper hole in each end. The shackle bolts are necked at both ends and the reduced diameters are threaded through a part of their length to receive nuts. The necked portions do not fit directly into the shackle links but split collars tapered on their outer surface to fit the tapered hole in the link are interposed. Thin washers are placed between the nuts and the collars, after which the nuts are drawn up tight. This forces the tapered collars into the tapered holes at the same time causing them to contract on the necked portions of the bolt, thus making the bolt a tight and rigid fit in the link. The thin washers are then bent over in such a way as to lock the nuts securely in place. The shoulders on the bolt space the links the desired distance apart, this distance being equal to the length of the bushing pressed into the spring eye, so that there is no side shake. With this construction the two bolts and two links become, in effect, a single piece which is exceptionally rigid. The bolts are made hollow to receive Alemite grease fitting and are so grooved on the bearing surface as to permit the grease to reach the whole bearing surface.

The use of a unit power plant with three point support has necessitated some changes in the frame as compared to that employed in the four. The side rails are practically unaltered, but there is a new and rigid cross member to support the front end of the engine and a wider and stiffer rear cross member above the gasoline tank. The central cross member is provided with wider flanges than were formerly used. The tubular cross members one of which was in front of the radiator, and one near the rear of the frame are now eliminated. The battery carrier is attached to the right side member of the frame, under the front seat, while the muffler and exhaust pipe are now on the right end.

The Front Axle

The front axle, made complete in the Mercer plant is substantially identical with that used and found highly satisfactory for several years. It is of conventional inverted Elliott type and is forged from nickel steel. The steering knuckles and arms are made of heat treated chrome nickel steel. The bent arms are originally forged straight. The tapered ends are then machined after which the arms bent to the desired form. The part is then carefully heat treated and tested for hardness. The steering pivots have ball thrusts and are given a 2½ deg. rake to the rear.

The Gemmer steering gear which has been used successfully on the four is used also in the six cylinder chassis. This is a worm and gear type. The steering post is slung on an adjustable bracket which permits of its being raised or lowered to suit the drivers of different stature.

The appearance of the front end of the car has been slightly altered by removing the tubular frame member in front of the radiator and changing the shape of the splash pan. The front horns of the frame are now provided with

fore and aft bolt holes for bumper mounting, and carry a new design of lamp bracket. This is triangular in side elevation and has at its upper end a socket in which forked lamp supports of various sizes can be attached.

The weight of the six-passenger phaeton is 3900 lbs. ready for the road including two extra tires. The complete car with closed body weighs about 4300 lbs.

Six standard body models are offered. The open models include a four-passenger roadster, six-passenger phaeton and four-passenger sport model. The closed bodies include a sedan and a touring limousine, each seating six, and a four passenger coupé. Body lines are similar to those which have characterized the Mercer cars in the past. The bodies are low hung and the passengers sit well down in the body, following European practice in this respect.

The open models will sell at $3,750 and closed cars for $5,000. These prices include, among other items, the following equipment: 6—32 x 4½ in. cord tires, Rudge Whitworth wire wheels on open models, artillery type wood wheels on closed models, Waltham clock and speedometer, Moto-Meter, Alemite lubricating system on chassis parts and a special form of finger operated dimmer switch arranged just under the steering wheel rim where it can be operated without taking the hand off the wheel.

A New Portable Electric Drill

PORTABLE drills are used for a variety of automotive production work and are also a most convenient tool for use in the service station. They are employed not only for drilling, as in body work and frame assembly, for example, but for setting screws, turning up nuts, valve seating and a variety of production jobs not easily accomplished on a fixed machine. They have, therefore, become a labor-saving device which is finding an increasing field of application.

Rapid advances have been made in recent years in the design of electric drills. This type of tool has been developed into a rugged and dependable machine capable of handling successfully drills of considerable diameter without the failures in service which characterized early products in this field. This has been brought about by greater care in construction as well as by better design —larger bearings, better ventilation and proper lubricating means as well as by superior electrical characteristics and materials. In addition convenient attachments such as screw feed devices, special handles and even bench presses have been added to increase the field of usefulness.

A good example of modern practice in drills of this type is that recently placed on the market by the A. F. Way Co. The features of this drill include a 1/3 hp. motor designed especially for the purpose by the General Electric Co., 20.7 to 1 reduction gear, plain, "wick packed" and oil tight bearings and a rigid aluminum housing with proper openings to insure, in connection with a blower mounted on the armature shaft, an adequate circulation of cooling air.

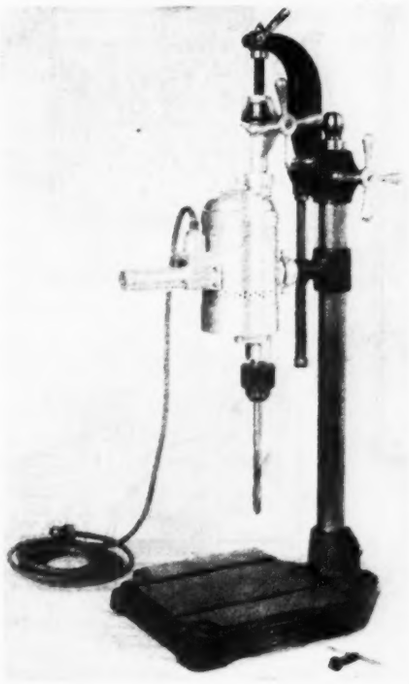
Probably the most unusual feature of this design is the use of a special form of plain bearings on the ½-in. armature shaft, which has a no load speed of 500 r.p.m. The bearing blocks are spool shaped and have two grooves in the babbitt lining. These grooves are parallel to the axis and terminate in holes which run through to the smaller outer diameter of the spool. Wool wicking is threaded through the groove and the holes and the loose ends are then wound around the spool several layers deep. When soaked in oil the wicking becomes, in effect, an oil reservoir from which the oil is fed automatically to the wicking in contact with the bearing surface. The feed is so gradual, however, that oil is not thrown out of the bearing. Any small amount which may tend to escape is prevented from so doing by felt washers provided for the purpose.

Brush holders are of the tubular G. E. type fitted with long springs and easily replaceable brushes good for at least 500 hours of operation. A standard G. E. snap lever switch is recessed into the handle in such position as to be near the operator's hand. The lead wire is covered with heavy rubber tubing and is securely fastened in place by four contracting jaws drawn up by a tapered nut.

The gear reduction is by spur pinions arranged in an over and under clock train. There are three steps in the reduction involving the use of six gears. Each pair of gears as well as the single gear on the chuck spindle, has a bronze bearing on both sides. Only the armature pinion is overhung and that has a long relatively high speed bearing. This pinion and the gear on the chuck spindle and threaded onto their shafts against shoulders, the threads being so made that the torque tends to tighten the pinion on the thread.

The small pinions of the gear train are integral with their shafts and are double the length of the bearing face. Half of this length is recessed into the splined hub of the gear, which is broached to fit it tightly. The use of keys is thus entirely avoided.

A ball bearing is provided to take the thrust of the chuck spindle, and this, in common with the gears and their bearings, is enclosed and packed with grease which fills the separate gear compartment. The drill is equipped with a ⅝-in. three-jaw Jacobs chuck.



The Way portable electric drill with screw feed attachment mounted on stand

The screw feed is provided with a hand wheel which operates through bevel gears. This avoids the use of a wheel concentric with the spindle and thereby maintains the same side clearance which is had without this attachment.

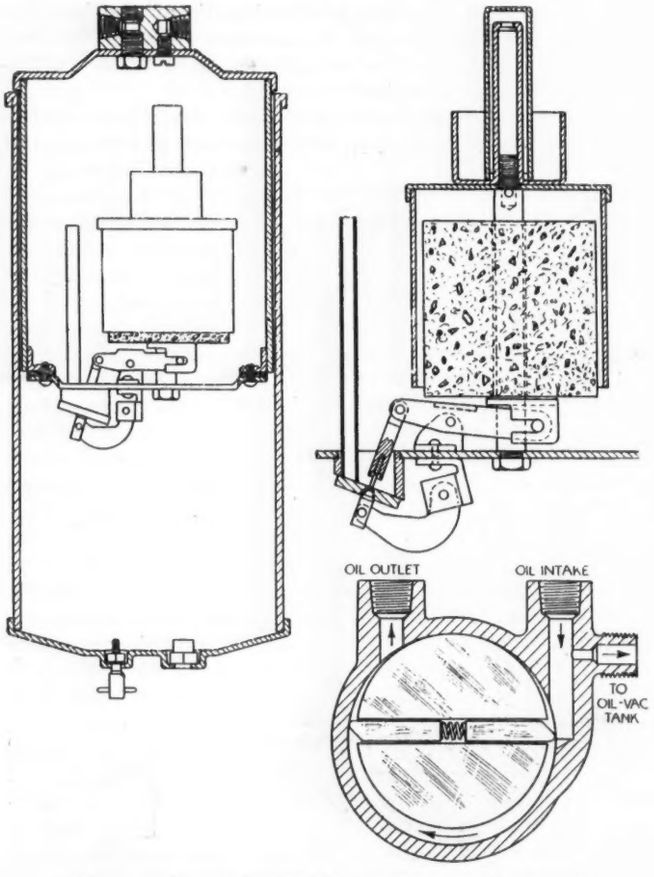
The drill stand shown in the cut converts the portable unit into a bench drill, which is an exceptionally convenient tool in any shop.

New Fuel Feed System Uses Vacuum Created by Oil Pump

Acts as safety device in that car will not operate when oil supply is exhausted. Vacuum increases with engine speed regardless of throttle opening. Installation includes vane type oil pump. Hydraulic control operates the only valve in entire system.

AN oil circulating and vacuum feed system has recently been placed on the market under the name "Oil-Vac." It is the product of Byrne, Kingston & Co. This system differs from other vacuum fuel feeds in that it utilizes vacuum produced by an oil pump instead of that created in the intake manifold. For this reason there is no infringement on patents covering fuel feed systems operated by manifold vacuum. In the Oil-Vac system vacuum increases with the speed of the engine and is not dependent upon throttle opening.

An engine equipped with this system cannot operate without oil. If the oil supply runs out vacuum ceases to exist and fuel ceases to flow thus preventing burning out bearings through exhaustion of lubricant.



Cross-sections of "Oil Vac" units showing details of tank construction, operating mechanism with hydraulic control of valve and vanes and rotor of special oil pump

The system consists of a fuel tank and an oil pump. The tank is made in two units. One unit is a slip tank which contains all the mechanism mounted on a detachable bottom plate held in place by screws and sealed by a cork gasket. The other unit is the incasing tank which holds the slip tank in its upper part while the lower part serves as a fuel reservoir. The tanks are made of Parkerized, soft drawn steel and are enameled.

Special Vane Type Pump

A vane type pump is used. This special pump is fitted to insure vacuum at low engine speeds. It can, if desired, take the place of the regular oil pump used to supply force feed lubrication. The vanes, which are machined steel, case-hardened, are arranged to slide in the eccentric rotor and are held apart with a spring. The pump housing is made of cast iron and the rotor is made of cold rolled steel.

At the pump inlet there is provided a connection for a pipe running to the top of the vacuum tank. The top fitting of the slip tank also contains a connection for a pipe running to the main fuel tank. The connection at the bottom of the outer tank leads to the carburetor.

Communication between slip tank and outer tank is through a valve, the only valve in the whole system. As the pump reduces the air pressure in the slip tank fuel is drawn in from the main supply tank. As the fuel level rises the cork float is lifted and the valve is opened by it when a certain height is reached. This permits the fuel to flow from the slip tank into the lower reservoir which connects with the carburetor.

This operation repeats until fuel in the reservoir reaches the valve opening at which level it is maintained throughout operation of the engine. The fuel supply which the carburetor draws upon remains at an approximately constant level, hence the static head is substantially constant. Air enters the lower tank through the space between the walls of the slip tank and the incasing tank.

Hydraulic Control of Valve

The hydraulic control of the valve is positive and no springs or toggles are employed. The float is of cork and is of such size that gas-logging does not affect its operation. The valve is always wet with fuel and is self-aligning and self-cleaning. It is easily inspected by lifting out the slip tank and the float mechanism is made accessible by removing the plate which forms the bottom of the slip tank.

Affixed to the mouth of the valve is a small standpipe,

the lower opening of which is closed when the valve is closed while the upper end is above the fuel high level. When the valve opens, air passes from the reservoir to the slip tank thus rapidly equalizing the pressure to permit quick dumping of fuel from the slip tank. The float is inclosed by a cover which prevents the fuel entering the slip tank from being discharged against the float.

The reservoir discharges its fuel to the carburetor regardless of what takes place in the slip tank, furthermore the slip tank pumps fuel only so fast as the reservoir discharges to the carburetor. The float chamber has no direct connection to the air, hence entrance of dust or dirt is rendered practically impossible.

A self-cleaning drain valve is provided to break up and remove any ice or caked dirt which may accumulate from the fuel.

A Combined Poppet and Sleeve Valve Engine

IN some recent tests conducted at Armour Institute of Technology under the direction of Profs. Daniel Roesch and H. A. White a single cylinder engine designed and built by Victor R. Stenger, formerly in charge of the experimental department of the Thomas-Morse Aircraft Corp., showed rather good power and low fuel consumption.

The engine was made to test a valve layout which consists of a single poppet valve A, shown in the cross sectional view, carried in a cage B, which also acts as a guide for the sleeve valve C. This cage is in reality the cylinder head and is held in place by the nut D threaded into the cylinder block. The poppet valve is operated in the conventional manner by the rocker arm E. The sleeve is operated in much the same manner by two parallel rocker arms F. The inlet and exhaust ports are shown by G and H respectively.

Among the claims made for this valve layout as compared to conventional types are the following: A gain of 20 deg. on the full opening period of the inlet port; greater ratio of valve area to the cylinder volume with consequent less throttling of the incoming and outgoing gases; low ratio of flame swept area to cylinder volume. The valve is readily accessible for cleaning and repairing, and there is said to be relatively even temperature for the cylinder walls and valve.

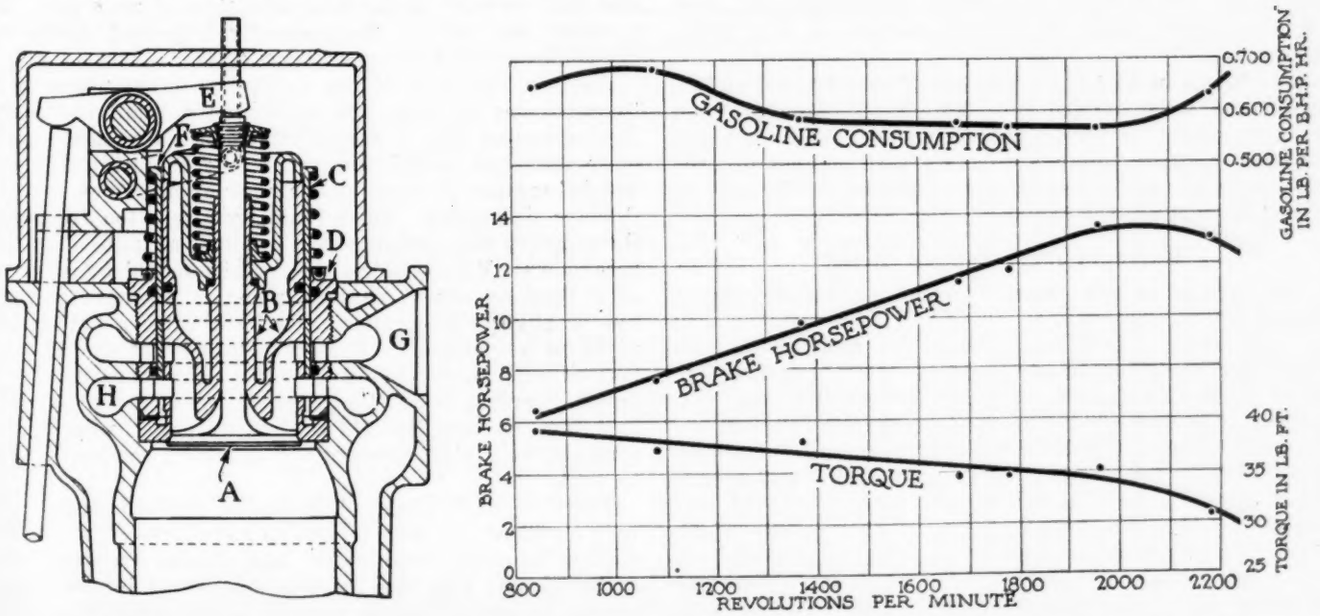
The curves shown were taken from average runs on a single-cylinder 4 x 5¾ in. engine. The fuel used in the tests was ordinary commercial gasoline.

All the working parts of the engine are inclosed and work in a spray of oil. From the sectional view it will be noted that the valve guide is made in such a way as to permit the introduction of water from the cylinder jackets to assist in keeping the valve cool. This is an important matter in this case where the single valve assumes a large diameter.

The entire valve mechanism can be removed in about 10 min. and one cylinder of a multiple can be repaired without disturbing the others. The threads on the member which holds the cage in the cylinder block are quite coarse and inasmuch as they never are subjected to the heat of the explosion they are not likely to stick.

THE popularity of motor buses is increasing to such an extent that the market which is derived from the demand for such vehicles promises to become a vitally important outlet for automotive products.

The world-wide growth of public automotive transportation is reflected in an increasing flow of reports to the Commerce Department from countries with a highly developed transportation system as well as from relatively unpopulated and undeveloped areas such as the Near East. In the course of one week reports on motor bus operations from London (Ont.), Geneva, Damascus, Aden and Melbourne have reached the Automotive Division.



Left—Sectional view of Stenger combined poppet and sleeve valve engine. Right—Power, torque and fuel consumption curves of Stenger engine

Showing Up the Weak Spots in Motorcycle Design

British Six Day Motorcycle Trial indicates marked improvements in design. Judges' report makes frank criticism of the entrants. Manufacturers learn much from this severe yearly contest.

By M. W. Bourdon

THE judges' report of the annual Six Days' Motorcycle Trial, organized by the national body of motorcycling, the Auto Cycle Union, records "vast improvement" over any previous trials result, though the detail design of the majority of the machines which competed does not escape somewhat severe criticism.

The trial this year was run during the week Aug. 21 to 26, and the course was in general decidedly severe, and while the full distance on the road was but 830 miles, it represented some thousands of miles of ordinary use in the hands of the average rider. On the whole the weather was favorable, though rain fell on two or three of the daily runs and wet roads were encountered on several others; the conditions were sufficient to be a severe test of mudguarding, etc., but not bad enough to make the test hills unduly difficult.

With one exception, there were no remarkably stiff hills, though gradients of from 10 to 20 per cent were frequent, many of them over mountain tracks—rutted, stony and grass grown. The stiffest gradient was one of 30 per cent and of considerable length; this was an optional test with five bonus marks for a successful climb, and of the forty-five competitors who made the attempt only two failed. Overheating was noticed on some of the longer climbs among the Welsh mountains, but even in this respect improvement was evident in this year's machines.

In all there were 142 starters out of an entry list of 144, and these were divided into ten classes, ranging from "featherweight" machines with engines of 250 cc. or under to solos, combinations and cyclecars with engines of 1100 cc. and less. Gold medals were awarded to 78, and 43 failed to complete the course.

Extracts from Judges' Report

The following are extracts from the judges' report issued late in September:

Cleanliness. There was enough bad weather to indicate that many machines should be better guarded. In view of the fact that they are usually traveling fast, protection from dirt carried by wind currents is of great importance in securing cleanliness for rider and machine. Oily dirt is very objectionable and ranks worse than road dirt, which is easily washed away, provided that water-excluding bearings are fitted or that proper shielding of transmission is adopted. The discharge of oil from the transmission or exhaust on to tires was rather too common and is particularly objectionable. Actual mudguards show improvement, and are mostly well designed for strength and ease of cleaning.

Light weight machines. Particular attention is drawn to the fact that it is primarily the very inexpensive light weight to which we must look to popularize motorcycling, and it is therefore very important that the small machines should be adequately mudguarded, well silenced and clean. The crude means adopted for lubrication of the transmission in many machines prevents them from being even reasonably clean.

Increasing Thermal Efficiency

The small engine can, it is evident, be increased in thermal efficiency to a point where performance appears to almost equal that of the largest types. This is apt to mislead the public as to the undoubted value of the larger engined machines, which use material in similar strength only less highly stressed. The larger machines are therefore capable of giving more reliable service and a more lasting standard of performance than the light weights when used under comparable conditions. The vibration of engine and transmission on many light weight motorcycles not only causes wear and tear, but gives great discomfort to the rider. In cases where weight of rider and machine are not greatly different, much can be gained by properly springing the rider alone. Possibly the general improvement in the final condition of cycle parts as a whole was due to the generally improved springing of saddles and the fitting of large tires.

Engines. In some of the lighter machines where it is impracticable to carry the engine on a relatively heavy cradle, a great deal of engine vibration takes place. Much more attention should be given to the balancing of light weight engines in some of the cheaper machines.

Valve Breakages. Valve breakages were too frequent; the ordinary rider regards such a failure as quite a serious breakdown. Valve guides and springs should be inclosed, as is done on several engines, when in consequence they can be slightly lubricated. Overhead valve gears should never be left exposed. It is regrettable that the lubrication of such parts should be left to the smearing-on of lumps of grease or constant applications of the oil-can. It is difficult to keep the lubricant in its place owing to the comparatively high temperature at which the parts have to work.

Two-Stroke Engines. Two-stroke performances were very excellent. If more attention were devoted to the reduction of petrol consumption and greater freedom from carbonization, this class of machine would in the larger classes become extremely popular on the grounds of simplicity and maintenance of tune alone.

It is of the utmost importance that adjustments, how-

ever simple, should not be frequently required on motorcycles, because they are seldom made at the right time. Motorcycles in particular should be simple, not only to ride, but to maintain. The difficulty of making adjustments on parts necessarily exposed to dirt is a serious point in the public mind.

More Silent Operation Needed

The modern engine requires too frequent decarbonization, and should therefore be made very accessible for the carrying out of this process.

Silence. A very notable improvement has taken place in general silence, but there is still room for an all-round reduction of noise. No really objectionably noisy machines were entered; but, on the other hand, no entry reached the desirable degree of silence.

Transmission systems in particular were frequently objectionably noisy. Much of this mechanical noise is produced by the absence of proper lubrication. Mechanical clatter is inexcusable.

Mufflers should be situated as near the valves as possible, and where an attempt is made to cool the expansion chamber, it should be remembered that at a distance from the port the heat gradient is so slight as to render finning ineffective.

Brakes. Each competitor was taken down the test hill at Brooklands on the 25 per cent gradient and required to pull up with the gear in neutral position.

In mechanical design and general operation brakes have improved enormously, more particularly front wheel brakes. Special brake drums are now the rule rather than the exception. Improvement in some of the front wheel brakes is still needed, however. Two points requiring attention are (*a*) side-car brakes, and the fitting of ratchet brakes to combinations to enable them to be held on a gradient. (*b*) Hand-operated adjustment should be provided, as it is not pleasant to require tools every time either brake has to be taken up.

Fittings, etc. The general aspect of most machines from the point of view of multiplicity of small parts is better. Greater accessibility on light weights is important, as is more standardization of nuts. Gearsets or their equivalent in chain transmission are still offenders on the score of being too light, with clutch parts and gear wheels of rather small dimensions. An undue proportion of retirements was due to gearset failure.

Steering Heads. Still need strengthening and larger ball races should be used where wear is possible.

Wheels and Bearings. Wheel bearings in many cases showed looseness and the rear wheels of several of the light weights suffered considerably. Rims were very good.

Lighting. It is regrettable that more machines were not fitted with electric lighting, which could be reduced considerably in cost if more widely used.

Foot Rests. The attachment of these is now much sounder than formerly.

Stands. To lift a relatively heavy machine on to a stand is not easy, and the fitting of "prop" stands in addition to the rear stand would be convenient for short stops.

Side-car Connections. Were sound throughout, and this despite the fact that the side-cars themselves were mostly heavy.

Controls. Many machines had clutch controls operated with difficulty from badly placed handles.

Reliability. As regards the finishing machines, it was very notable that general mechanical design and construction had been very much improved. Only three machines which completed the course lost the maximum award on account of deduction of marks at the final examination.

Improvement Over Previous Trials

This is a vast improvement over any previous Six Days' Trial result, and is a matter for congratulation to manufacturers. Now that engine power is ample there is no tendency to cut weight in important parts, with the result that from a mechanical point of view construction is much sounder. On the other hand, the percentage of retirements, namely, 30.3 of starters, is the highest of any trial since the war.

General Remarks. The motorcycle, from the most inexpensive light weight to the heaviest combination, has, in spite of many manufacturing difficulties, made enormous strides in general convenience, reliability, comfort and simplicity.

There is no make of machine receiving a premier award that cannot be used with confidence, and the objections of many of the buying public as regards noise, dirt, and complications have been met to a remarkable degree.

The 1922 Six Days' Trials provided a severe test, and as many of the retirements are attributable to causes beyond control, such as collisions, it is remarkable that such good performances have been shown.

Motorcycles Selling Well in South Africa

THE motorcycle business in South Africa has suffered but little from the general depression of the last eighteen months, says Vice Consul Cawston, Capetown, in a report to the Department of Commerce, as many people who would have purchased passenger cars under normal conditions have bought motorcycles instead. While the passenger car and truck business has fallen off tremendously during the past year, most of the motorcycle dealers state that their business is holding up well, and one agent in Cape Town who handles one of the best selling American motorcycles in South Africa says that he is selling almost as many machines now as he did during 1920.

Heavy, powerful motorcycles are the most popular in South Africa.

People who in the United States would not ride motorcycles ride them extensively in South Africa. It is not at all uncommon to see well-to-do and sometimes prominent men riding motorcycles in this country, often carrying their wife and one or two children in a side car. The economy of operation which is a very important factor in motor transportation in this country as gasoline costs from 60 to 70 cents a gallon, is another important reason why many people prefer motorcycles to other motor vehicles.

Although more British machines were sold in South Africa before the war than American makes, motorcycles from the United States are now more popular than English machines and according to reliable figures twice as many American machines are now sold here as English.

Gear Makers Urge Better Cost Systems and Discuss Technical Problems

Careful estimating, apprentice training, standardization and the measuring of gear noise chief topics considered at convention of American Gear Manufacturers' Association. Technical progress reported. History of gear development traced from ancient times.

By P. M. Heldt

THE necessity for more careful estimating in the gear industry was the chief topic of discussion at the semi-annual meeting of the American Gear Manufacturers' Association, which was held at the Drake Hotel, Chicago, on Oct. 9, 10 and 11. The standard method of cost accounting developed by the Association is a great help in this connection, but, unfortunately, it is not as widely used as would be desirable, and some members believe that the Association could do much more in propagating sensible methods of estimating.

On the other hand, the Commercial Standardization Committee realizes that there are certain limitations to its activities, set by law and by court rulings, and there is absolutely no intention to venture on legally dangerous grounds. In the discussion of this subject it was brought out that another association had been advised by attorneys that it would be unwise to suggest uniform action on—

Furnishing samples of machines with or without charge.

Acceptance of quantity future delivery contracts according to which products are to be delivered and accepted by the purchaser.

Length of time contracts for future delivery.

Length of time payment and discounts to be extended to different classes of customers.

Allowing all or part of delivery charge.

Consigning stock to central stations.

Furnishing without cost, of advertising matter, etc., to resale customers.

The same attorneys, however, approved the use of a uniform contract form if legally approved, as adopted by A. G. M. A. last year.

Commercial Standardization

Various committee reports were presented at the opening meeting, including that of the Commercial Standardization Committee to which reference has been made already. In this report the importance of using the standard costing system was emphasized and illustrated by the following example: A certain company with a capitalization of a million and a half dollars pushed one particular branch of its business because it believed it to be the most profitable branch, but when a proper costing system was applied in this department, it was found that it had been run at a loss for years and was entirely discontinued. The committee believes that the work of standardizing methods of estimating, which is now being taken up by the Cost Association Committee, is of prime importance.

The Purchasing Agents' Association has been working for years on proposed standard invoices and buying forms, and, when this work yields results, they will be presented to the A. G. M. A. with a view to their adoption for use among gear makers. An inquiry was made by the committee as to the use by members of the Association's present commercial standards, and it was found that out of 49 companies sending in replies, only 11 made use of the proposal form, while 11 more expected to put it into use in the near future. Of the 27 not using the form a great many gave as their reason that they had found their own letterheads satisfactory for this purpose.

Training Machine Shop Help

In his report for the Industrial Relations Committee, J. B. Foote referred again to the apprenticeship system. He had made an inquiry among members of the Association and found that very few kept apprentices, one complaining that he could not get good boys. Foote came to the conclusion that mechanical training schools supported by manufacturers in any particular district, for instructing young men in the every day operation of lathes, drill presses, planers, shapers, etc., was a better plan than co-operation with technical schools taking the form of part time employment of students. The latter plan had not proved practical for several reasons. Manufacturers as a rule cannot afford to have a lot of machines stand idle part of the time to have them available for the students when they arrive at the plant. At a special school young men could get training and be developed into all-around machinists in two to three years. The manufacturers of the district would furnish the work or the material on which to operate, and for passable products by advanced students they would pay at rates corresponding to the cost of production in their own plants.

Chairman B. F. Waterman of the General Standardization Committee made a report both for that committee and for the Sectional Committee of the American Engineering Standards Committee. Last spring the committee passed for printing five standards, namely, Gears and Pinions for Electric Railway Service, Gray Iron Industrial Spur Gears, Specifications for Forged and Rolled Steel for Gears, Specifications for Brass and Specifications for Bronze. These were printed in

Mechanical Engineering for May and on Sept. 26 were reconsidered in the light of criticism and correspondence on them which had been received in the meantime. It is now proposed to submit them to the sponsor bodies for their approval as tentative American standards, whereupon they may be submitted to the Main Committee as such.

At the last meeting it was decided to submit for approval for printing the standard on composition gearing, recommended practice for inspection of gears, recommended practice for herringbone gears and recommended practice for industrial spur gears.

Progress of Standardization Work

In the report of the General Standardization Committee was given an outline of the work so far done and that now in hand by the several sub-committees. In this connection it is of interest to note that the Tooth Form Committee has under way experimental work to determine the possibilities of a stub tooth profile which would permit the use of the same proportions of tooth elements as now in common use and, at the same time, give the advantages of a longer tooth, which many think desirable.

F. L. Eberhardt said that the committee so far was in full accord on only one feature of the stub tooth—that the pressure angle should be 20 deg. E. W. Miller, engineer of the Fellows Gear Shaper Co., which concern originated the common form of stub tooth designated by dual pitch numbers, admitted that the change in proportion of tooth elements with the diametral pitch was illogical. This system was adopted because it was convenient to the manufacturers of gear cutting machinery, but in order to be consistent the proportions of the tooth elements should be constant throughout. It was pointed out that both the Dutch and the French engineering standardization bodies are working on stub tooth forms, and Waterman said that he recently saw a German standard for the proportions of change gears for machine tools. Eberhardt also referred to the subject of short and long addendum gears, but ventured the opinion that in taking up this matter the committee would enter the field of specialized gear forms.

George L. Markland of the Philadelphia Gear Works presented a short paper on The Evolution of the Gear. He traced gear history from the time when metal pinions and racks were used in water clocks in Egypt 300 B. C. Mechanism for cutting clock wheels, built about 1750, was still in use for the same purpose in 1908. Epicycloidal teeth, or, rather teeth approaching to the epicycloidal form, were used first. Leonardo da Vinci (1690-1730) occupied himself with the problem of gear tooth form. An English book by Mandey, published in 1702, in an appendix deals with epicycloids and their use in mechanisms, it being stated that the matter on this subject was taken from a French book published in 1700. Camus, a French engineer (1699-1768), wrote an article on gear teeth about 1738, an English translation of a later edition of which was brought out by John Isaac Hawkins in 1868. Hawkins says he was at first willing to agree that the epicycloid was the only gear form, but he later came to the conclusion that the involute would supersede it.

The report of the Spur Gear Committee was made by the chairman, Frank E. Eberhardt, of the Newark Gear Cutting Machine Co. This was a report of progress only. An outline was given of the work to be put through during the winter months. Horsepower tables have been obtained from the members and are being arranged for convenient use by gear makers and users. In connection with the power transmitting capacity of gears, it is getting to be more and more important to consider the tooth form, number of teeth in contact and the present day higher speed ranges. It is the plan of the committee to shortly present a good working table of safe horsepowers for general industrial gearing. The Nomenclature Committee, of which F. E. Eberhardt is also chairman, had obtained from members the names and symbols in use in their respective factories and in committee work, and planned to tabulate the material for distribution and criticism. The Sectional Committee of the American Engineering Standards Committee had made available to the Nomenclature Committee valuable data from abroad and this is being checked with our own terms, which, it is believed, will result in a more uniform nomenclature.

The Tooth Form Committee made a progress report. Since the last meeting Earle Buckingham of the Niles-Bement-Pond Co. had joined the committee. Data are being compiled on all tooth forms, particularly stub teeth. Samples have been secured of stub tooth gears made with disk cutters, planing cutters and hobs. A grouping according to pressure angle as in the Gleason bevel gear system might be feasible. The Baush & Lomb Optical Co. had placed one of their projectoscopes at the service of the committee and the Jones & Lamson Machine Co., a Hartness comparator.

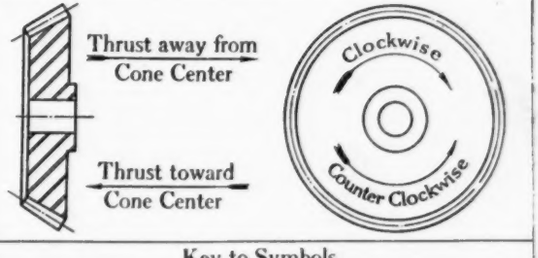
During the evening session on Monday P. C. Molter, superintendent of the Department of Industrial Education of the National Metal Trades Association, presented a paper on "Apprenticeship," outlining the system developed by his association.

Bevel Gear Report

The Bevel and Spiral Bevel Gear Committee, through its chairman, F. E. McMullen, submitted for adoption the system of bevel gear design presented and discussed at the meeting in Buffalo last spring. Mr. McMullen said that descriptions of this system had been sent to all members the past summer and that, since it had undoubtedly been tried out by them, he looked forward to considerable discussion. It was explained that the sys-

Spiral Bevel Gear Axial Thrust

Driving Member		Value of Axial Thrust Arrow indicates thrust direct of each factor. Resultant direction is that of larger factor.	
Hand of Spiral	Rotation		
Right	Clockwise	Driving Member	$T = Z\left[\left(\overleftarrow{\tan \angle H \cos \angle P}\right) - \left(\overrightarrow{\frac{\tan \angle O \sin \angle P}{\cos \angle H}}\right)\right]$
Left	Counter Clockwise	Driven Member	$T = Z\left[\left(\overrightarrow{\tan \angle H \cos \angle P}\right) + \left(\overrightarrow{\frac{\tan \angle O \sin \angle P}{\cos \angle H}}\right)\right]$
Right	Counter Clockwise	Driving Member	$T = Z\left[\left(\overrightarrow{\tan \angle H \cos \angle P}\right) + \left(\overrightarrow{\frac{\tan \angle O \sin \angle P}{\cos \angle H}}\right)\right]$
Left	Clockwise	Driven Member	$T = Z\left[\left(\overleftarrow{\tan \angle H \cos \angle P}\right) - \left(\overrightarrow{\frac{\tan \angle O \sin \angle P}{\cos \angle H}}\right)\right]$



Key to Symbols

T—Axial Thrust Load
Z—Transmitted tooth load tangential to pitch circle.
∠O—Pressure Angle
∠H—Spiral Angle
∠P—Pitch Angle

tem was intended for generated bevel gears only and that it was to supersede all standards of tooth proportions previously adopted. The report included a table of tooth proportions for the lower numbers of teeth in spiral bevel pinions, which forms an extension of a similar table printed in the original report. In addition it contains a table of values for the factor y in the Lewis formula for gear strength, for both spiral and straight bevel gears. These factors were obtained by considering the load applied at the outer end of the tooth. In the explanation of the system, however, it was pointed out that the point of application of the load should be determined for each combination, since it is a function of the number of teeth in contact. The calculated strength of the gears based on the Gleason method would be greater than that obtained by the Lewis method, in some cases as much as 100 per cent. It was felt, however, that, owing to the general familiarity with the Lewis formula, it would be desirable to submit values of the constant y entering into that formula. The report also contained a chart giving the formulas for calculating the axial thrust in spiral bevel gears for different combinations of spiral and direction of rotation. This table is intended chiefly to obviate mistakes due to differences in nomenclature.

In commenting on this report, S. O. White of the Warner Gear Co., suggested that the recommendations ought to be kept in the form of recommended practice for a considerable time. His firm had made some use of the system in an experimental way and considered it logical and consistent. They had found, however, that frequently they were obliged to deviate slightly from the proportions recommended. Several members seemed to consider it unnecessary to have three pressure angles, and the elimination of the intermediate angle, 17½ deg., was suggested, but McMullen in reply said that if this were done some desirable quality would be sacrificed. As regards the addendum, it was brought out that a long addendum not only adds to the strength of a pinion with a small number of teeth but it also gives longer wear. Waterman inquired whether the proposed form of tooth would be used for the inside gears of a differential and whether by the adoption of this standard the Association would be adding to the burden of gear cutters. Reply was made by S. O. White who said that the Committee on Differentials had been endeavoring to standardize some form of inside gears. These gears do not function except when a vehicle turns a corner and the tooth form from some points of view is, therefore, not of any great moment. So far nothing has been accomplished in this direction.

S. O. White, chairman of the Differential Committee, made a progress report. Drawings have beeen made of two sizes of differentials with inside gears complete, with 20-11 and 18-10 teeth of 5-7 pitch. These have been sent out to the membership and should return soon. It may be necessary to divide the subject of standardization of differentials into three parts, viz., outside or case

TABLE 1

Addendum for 1 Diametral Pitch for Spiral Bevel Gears

To obtain addendum select from table value corresponding to ratio given by this formula:

$$\text{Ratio} = \frac{\text{Number of teeth in gear}}{\text{Number of teeth in pinion}}$$

Ratios		Add.	Ratios		Add.	Ratios		Add.	Ratios		Add.
From	To		From	To		From	To		From	To	
1.00	1.00	.850	1.15	1.17	.750	1.41	1.44	.650	1.99	2.10	.550
1.00	1.02	.840	1.17	1.19	.740	1.44	1.48	.640	2.10	2.23	.540
1.02	1.03	.830	1.19	1.21	.730	1.48	1.52	.630	2.23	2.38	.530
1.03	1.05	.820	1.21	1.23	.720	1.52	1.57	.620	2.38	2.58	.520
1.05	1.06	.810	1.23	1.26	.710	1.57	1.63	.610	2.58	2.82	.510
1.06	1.08	.800	1.26	1.28	.700	1.63	1.68	.600	2.82	3.17	.500
1.08	1.09	.790	1.28	1.31	.690	1.68	1.75	.590	3.17	3.67	.490
1.09	1.11	.780	1.31	1.34	.680	1.75	1.82	.580	3.67	4.56	.480
1.11	1.13	.770	1.34	1.37	.670	1.82	1.90	.570	4.56	7.00	.470
1.13	1.15	.760	1.37	1.41	.660	1.90	1.99	.560	7.00	....	.460

TABLE 2

Values of "K" for Circular Thickness Formula

Select value corresponding to number of teeth in pinion and ratio given by above formula.

Number of teeth in pinion	Ratios →	Values of "K" for different ratios														
		1.00 to 1.25	1.25 to 1.50	1.50 to 1.75	1.75 to 2.00	2.00 to 2.25	2.25 to 2.50	2.50 to 2.75	2.75 to 3.00	3.00 to 3.25	3.25 to 3.50	3.50 to 3.75	3.75 to 4.00	4.00 to 4.25	4.50 to 5.00	5.00 to ....
9		.000	.010	.025	.040	.055	.070	.085	.095	.105	.115	.125	.135	.150	.165	.185
8		.000	.010	.030	.045	.065	.080	.095	.110	.125	.135	.145	.155	.170	.180	.195
7		.000	.025	.050	.075	.095	.115	.135	.155	.170	.185	.195	.205	.220	.235	.250
6		.010	.035	.060	.085	.105	.130	.150	.165	.180	.195	.210	.220	.235	.250	.265
5		.020	.040	.075	.110	.135	.155	.170	.185	.200	.215	.230	.240	.255	.270	.285

VALUES OF OUTLINE FACTORS "Y" FOR BEVEL GEARS
Proportioned According to the Gleason Works System

For use in the Lewis Formula. Values below are for either gear or pinion.

STRAIGHT BEVEL GEARS

Number of teeth in pinion	Ratios														
	1.00 to 1.25	1.25 to 1.50	1.50 to 1.75	1.75 to 2.00	2.00 to 2.25	2.25 to 2.50	2.50 to 2.75	2.75 to 3.00	3.00 to 3.25	3.25 to 3.50	3.50 to 3.75	3.75 to 4.00	4.00 to 4.50	4.50 to 5.00	5.00 to ....
	Values of "Y" for Lewis Formula														
10	.231	.260	.280	.294	.305	.315	.324	.332	.340	.347	.353	.358	.365	.371	.377
11	.268	.264	.273	.286	.296	.303	.309	.315	.320	.324	.328	.332	.336	.340	.342
12	.248	.265	.281	.295	.308	.318	.328	.335	.341	.345	.348	.351	.353	.355	.356
13	.264	.278	.291	.280	.278	.286	.291	.295	.298	.299	.301	.303	.305	.307	.310
14	.242	.254	.263	.272	.281	.288	.294	.299	.304	.307	.310	.313	.316	.318	.319
15	.248	.258	.266	.274	.283	.290	.296	.301	.305	.308	.312	.315	.318	.319	.320
16	.252	.261	.269	.277	.285	.292	.298	.304	.308	.312	.314	.317	.319	.321	.323
17 to 18	.257	.265	.273	.281	.288	.295	.302	.307	.311	.315	.318	.320	.322	.325	.326
19 to 21	.265	.272	.279	.286	.294	.300	.307	.312	.317	.320	.324	.326	.328	.330	.332
22 to 25	.274	.281	.288	.295	.301	.307	.314	.319	.324	.327	.331	.332	.335	.337	.338
26 to 30	.284	.291	.297	.304	.310	.317	.322	.327	.332	.336	.339	.342	.344	.346	.347

SPIRAL BEVEL GEARS

Number of teeth in pinion	Ratios														
	1.00 to 1.25	1.25 to 1.50	1.50 to 1.75	1.75 to 2.00	2.00 to 2.25	2.25 to 2.50	2.50 to 2.75	2.75 to 3.00	3.00 to 3.25	3.25 to 3.50	3.50 to 3.75	3.75 to 4.00	4.00 to 4.50	4.50 to 5.00	5.00 to ....
	Values of "Y" for Lewis Formula														
5	.297	.322	.343	.361	.376	.388	.398	.406	.411	.416	.420	.424	.431	.438	.450
6	.310	.332	.353	.372	.386	.398	.406	.414	.419	.424	.428	.431	.436	.443	.452
7	.318	.333	.347	.360	.373	.384	.392	.398	.405	.410	.415	.419	.426	.432	.439
8	.298	.320	.336	.348	.357	.366	.373	.379	.384	.388	.392	.394	.397	.400	.405
9	.292	.313	.327	.338	.346	.352	.357	.363	.367	.370	.373	.376	.380	.384	.388
10	.315	.338	.353	.363	.371	.345	.326	.342	.351	.357	.363	.367	.371	.374	.377
11	.316	.335	.343	.325	.327	.333	.338	.344	.350	.356	.361	.367	.375	.384	.390
12	.298	.318	.333	.343	.351	.357	.363	.368	.372	.377	.379	.381	.384	.386	.388
13	.302	.320	.334	.343	.351	.358	.365	.371	.376	.381	.384	.386	.388	.391	.393
14	.306	.322	.334	.345	.354	.362	.369	.374	.378	.382	.386	.389	.391	.393	.395
15	.314	.330	.342	.352	.360	.368	.374	.380	.385	.389	.392	.394	.397	.399	.402
16	.322	.335	.347	.358	.367	.374	.381	.386	.390	.394	.397	.400	.402	.404	.406
17 to 18	.329	.343	.354	.364	.373	.382	.389	.394	.398	.400	.403	.406	.407	.409	.410
19 to 21	.339	.351	.362	.373	.382	.389	.396	.401	.405	.407	.410	.411	.412	.414	.415
22 to 25	.351	.363	.373	.382	.391	.398	.403	.407	.410	.412	.413	.414	.415	.417	.418
26 to 30	.364	.374	.384	.393	.399	.404	.407	.410	.412	.414	.415	.416	.417	.418	.419

mounting dimensions, inside dimensions and gear tooth design. The S. A. E. favors fixation of the outside dimensions only. A capacity rating for each size seems desirable from an A. G. M. A. point of view, and Mr. White said he would like an expression of opinion as to how far this standardization should be carried.

L. G. Hewins, sales manager of the Van Dorn & Dutton Co., presented a paper bearing the title "Why Buy a Pig in a Poke?" Mr. Hewins recommended buying drop forgings, hand forgings and castings by the piece instead of by weight. He claimed that if this practice was followed the parts would come much nearer true to drawings, which meant less machining and less unnecessary weight. If this system of buying is used the foundry and forge won't add to the weight at every opportunity, as they are tempted to do under present conditions. Hewins gave a number of practical examples illustrating the advantages of the method. In one case it was found that a certain hand forging could be made to weigh 85 lb. when paid for by the piece, whereas the same forge had formerly turned out these forgings weighing an average of 100 lb. They had been asked previously to make the blanks closer to size but had replied they couldn't do it. Much of the excess weight was due to excessive stock where the forging had to be finished, and it was found that 40 cents a piece could be saved on turning time after the new method of buying had been introduced. On malleable castings Hewins had so far found

Spiral Bevel Gears

For generated spiral bevel gears operating at right angles where the pinion is the driver and has less than 10 teeth.

The proportions given below have been based on the assumption that the spiral angle used is 30 degrees. In order to obtain the desired tooth action it is recommended that the spiral angle selected should not be less than 27 degrees.

WORKING DEPTH, WHOLE DEPTH, PRESSURE ANGLE

For combinations having	Working Depth	Whole Depth	Pressure Angle
9 teeth in pinion	$\frac{1.700 \text{ in.}}{\text{D.P.}}$	$\frac{1.888 \text{ in.}}{\text{D.P.}}$	17½ deg.
8 teeth in pinion	$\frac{1.600 \text{ in.}}{\text{D.P.}}$	$\frac{1.788 \text{ in.}}{\text{D.P.}}$	17½ deg.
7 teeth in pinion	$\frac{1.600 \text{ in.}}{\text{D.P.}}$	$\frac{1.757 \text{ in.}}{\text{D.P.}}$	20 deg.
6 teeth in pinion	$\frac{1.500 \text{ in.}}{\text{D.P.}}$	$\frac{1.657 \text{ in.}}{\text{D.P.}}$	20 deg.
5 teeth in pinion	$\frac{1.400 \text{ in.}}{\text{D.P.}}$	$\frac{1.557 \text{ in.}}{\text{D.P.}}$	20 deg.

ADDENDUM OF GEAR

For combinations having

9 teeth in pinion: $\text{Addendum of gear} = \frac{\text{Addendum for 1D.P. (Table 1)}}{\text{D.P.}}$

8 teeth in pinion: $\text{Addendum of gear} = \frac{\text{Addendum for 1D.P. (Table 1)}}{\text{D.P.}} \times \frac{80}{85}$

7 teeth in pinion: $\text{Addendum of gear} = \frac{\text{Addendum for 1D.P. (Table 1)}}{\text{D.P.}} \times \frac{80}{85}$

6 teeth in pinion: $\text{Addendum of gear} = \frac{\text{Addendum for 1D.P. (Table 1)}}{\text{D.P.}} \times \frac{75}{85}$

5 teeth in pinion: $\text{Addendum of gear} = \frac{\text{Addendum for 1D.P. (Table 1)}}{\text{D.P.}} \times \frac{70}{85}$

ADDENDUM OF PINION

For all combinations: Addendum of pinion = Working Depth − Addendum of gear.

DEDENDUM OF GEAR

For all combinations: Dedendum of gear = Whole Depth − Addendum of gear.

DEDENDUM OF PINION

For all combinations: Dedendum of pinion = Whole Depth − Addendum of pinion.

CIRCULAR THICKNESS OF GEAR

For all combinations having

9 teeth in pinion: $\text{Circular thickness of gear} = \frac{.976 \text{ in.}}{\text{D.P.}} + [.7 \times \text{Addendum of gear}] - \frac{\text{K(Table 2)}}{\text{D.P.}}$

8 teeth in pinion: $\text{Circular thickness of gear} = \frac{1.011 \text{ in.}}{\text{D.P.}} + [.7 \times \text{Addendum of gear}] - \frac{\text{K(Table 2)}}{\text{D.P.}}$

7 teeth in pinion: $\text{Circular thickness of gear} = \frac{.931 \text{ in.}}{\text{D.P.}} + [.8 \times \text{Addendum of gear}] - \frac{\text{K(Table 2)}}{\text{D.P.}}$

6 teeth in pinion: $\text{Circular thickness of gear} = \frac{.971 \text{ in.}}{\text{D.P.}} + [.8 \times \text{Addendum of gear}] - \frac{\text{K(Table 2)}}{\text{D.P.}}$

5 teeth in pinion: $\text{Circular thickness of gear} = \frac{1.011 \text{ in.}}{\text{D.P.}} + [.8 \times \text{Addendum of gear}] - \frac{\text{K(Table 2)}}{\text{D.P.}}$

CIRCULAR THICKNESS OF PINION

For all combinations: Circular thickness of pinion = 3.142 − Circular thickness of gear.

it impossible to get bids under the new plan, but he hoped to succeed there, too, later on.

On Tuesday evening an informal banquet was held, J. B. Foote acting as toastmaster. The musical entertainment and the speakers of the evening were furnished by the Chicago members. The speakers were the Hon. Marcus Kavanaugh, Judge of the Superior Court of Cook County, Ill., and Gen. John D. Clinnin. Contrary to custom on such occasions, both spoke in a serious vein on topics of national interest. The subject of Judge Kavanaugh's discourse was "Business Men and Law Enforcement." The judge dealt with the great increase in crime, and especially in murder and manslaughter, in this country in recent years and impressed upon the members their duty as citizens to do all in their power to suppress this crime wave. They should not try to evade their jury duty and when on such duty should see to it that criminals get their just deserts. Gen. Clinnin spoke on "The World War and Its Effects on American Business." He pointed out that there were in the Treaty of Versailles at least six clauses that tended to breed future wars, and he predicted that, just as the United States had entered the war and assured victory for the Allies so it would have to step in again in the near future and demand a revision of the Versailles Treaty on such lines as to eliminate these features that tended to breed further wars. The position of the United States as creditor of the various allied nations and the demand of further financial assistance from European states would enable it to take such a step.

At the final session on Wednesday morning, Prof. A. E. White, director of the Department of Engineering Research, University of Michigan, presented a paper on Engineering Research. Prof. White discussed what should be the research program of the universities and of the technical associations. He had been glad to note in the morning papers that the Meat Packers' Association, which was simultaneously holding its convention at the same hotel, had decided to institute an extensive research program. The encouragement of research work was one of the objects of all technical societies, but difficulties were encountered owing to lack of funds. To raise the necessary funds it would, in many cases, be necessary to increase the membership dues, and in the case of strictly technical associations this was practically out of the question, as it would mean the loss of a great many members. The A. G. M. A., on the other hand, represented an entirely different case. It was largely made up of executives of large, going concerns, and sufficient funds for this service should be made available.

Gear Noise Research

Under the direction of Prof. White, Prof. Daniel L. Rich has been making an investigation at the University of Michigan of the problem of measuring or comparing noises, and Prof. White said that they had come to the conclusion that at an expenditure of $3,500, distributed over a period of one year, it would be possible to develop a device for comparing the noise of an individual pair of gears and with an expenditure of an additional $3,500 it would be possible to develop an apparatus capable of determining the noises not only in simple sets but in trains of gears. If the Research Department of the University were entrusted by the Association with this work, absolutely no overhead would be charged. If the work were important to the Association or to any section thereof, it should be carried out, either at Michigan University or at some other institution, if one could be found that had better facilities.

This problem of measuring gear noises comes up in connection with the work of the inspection department, and J. E. Frost, a member of the inspection committee, presided at this session. One of the members wanted to know what would be the further procedure after the apparatus referred to in Prof. White's plan had been developed. Frost said that it was necessary to first have some instrument for comparing noises, next a stand-

ard of noise must be established and, finally, the various causes of noisy operation must be investigated. He thought that if arrangements along the lines indicated could be made between the Association and the University it would be of benefit all around. In the past students had been working largely on abstract problems that did not interest them, whereas here was a chance to set them to work on a problem of immediate practical value.

Bethune of the Gleason Works expressed the fear that if the work was not done hand in hand with the men in the industry, the results would be of no practical value. They might tell the practical men that the sound waves which were most objectionable had a certain wave length but that would be of little help to the men in the shop. Prof. White stated that it was the purpose to do the work in co-operation with a committee of the A. G. M. A. He said that it had been suggested that the expense of such an investigation could be shared with the automobile industry. A motion was made that a committee be appointed, but it was later decided to leave the decision in the matter with the Executive Committee.

Standard Keys for Shafting

Not much progress was made during the past half year in the work of the Keyway Committee. A meeting of the A. S. M. E. committee on shafting and keyways was scheduled for Oct. 19 and it was decided by the A. G. M. A. committee to postpone further action until after that meeting. Lars Nilson, chairman of the committee, stated that few men had any decided views on the subject of keyway sizes, as shown by the fact that of about 190 who replied to a questionnaire, practically all seemed to be satisfied with the first A. S. M. E. table or list of sizes. C. B. Hamilton, Jr., criticized the proposed table of keyway sizes, which was originally submitted at the Buffalo meeting, for the reason that it contained a lot of bastard or non-standard sizes. He referred to one size in particular which he said was a paper standard, but not actually manufactured. He said that many people were only too willing to agree to anything that looked as though someone else had done effective work on it. There were altogether too many sizes, and in practice it was not nearly so important that a key size were theoretically correct as that you could get the stock called for. It developed in the further discussion that the A. S. M. E. committee planned to prepare a table for key sizes for shafts up to 6 in. diameter only, but the A. G. M. A. committee wants to go as far as 12 in. diameter.

Inspection Report

F. G. Eppley presented the report of the Inspection Committee which proposed certain recommended practices. Under the heading "Hardness Test" it was stated that "the scleroscope is recommended for testing hardness of gears, but it is necessary to keep the scleroscope in good condition, and therefore checks of the instrument should be made at intervals. In case of argument the Brinell hardness test is recommended as final." C. B. Hamilton, Jr., made the objection to this section that no mention was made of the Rockwell testing device which, he said, was in some ways better than both of the other two (Brinell and Scleroscope). He moved that this section of the report be held over for six months and gone over in conjunction with the Metallurgical Committee. This request was acceded to. Mr. Copland objected that the report did not give any tolerances. For instance, it was stated that a gear must have an accurate involute curve in order to function properly, but no tolerances for permissible variations from the true involute form were given and it was well known that it was commercially impossible to produce teeth of absolutely true form. In reply to this objection it was stated that the setting of tolerances fell within the province of other committees, such as the spur gear committee, the herringbone gear committee, the keyway committee, etc., and all that the inspection committee had to do was to suggest methods for determining whether any gear was within the specifications to which it was to be made. One speaker doubted the possibility of observing limits on the involute form. The report with the hardness test section eliminated was finally adopted and therefore became a recommended practice. It reads as follows:

Involute Curves.—In order to determine the accuracy of the involute curve, it is necessary to have some instrument which will check this curve in the same manner as it is unwound from a base cylinder.

An instrument of this type should have a straight edge rolling on the base circle of the gear and an indicator fastened to the straight edge, the indicator point being in contact with the gear tooth to be tested.

As the straight edge is moved along, it will roll the base circle and also the gear attached to the base circle and the indicator which is in contact with the great tooth should register zero if the involute curve is correct. If it is not correct, it will show the amount of inaccuracies.

It is necessary that a gear have an accurate involute curve in order to function properly, and the involute curve-testing instrument can determine this; also whether a gear has been cut off center and whether the pressure angle of the gear is correct, etc.

Angular Velocity.—If a pair of gears are properly mated, they should function with uniform angular velocity but, in order to know this, it is necessary to have some instrument for so testing.

The principles embodied in an instrument of this type should be to test a known motion, such as produced by a pair of rolls, against the unknown motion produced by the mating gears, and the variation of the gears should be automatically recorded on a paper chart. If the tooth curves are correct and the spacing is correct, gears should run with uniform angular velocity, but if the tooth cuve is not correct, these instruments would show a variation in motion, or, if the spacing of the teeth is nonuniform, it will also show a variation in motion.

Thread Inspection.—"Go" and "No go" plug and ring gages of proven dimensions, the "Three Wire Method" for pitch diameter, or the projection method for pitch diameter, outside diameter, lead, angle and form should be used.

All plug gages and taps should be tested by the projection method.

External Threads.—If shown to be of proper diameter by the use of the "Three Wire Measurement," and at the same time a good fit in a ring gage, this is proof the lead, profile and pitch diameter are correct.

On threads coarser than twelve per inch, good results can be obtained by the use of Prussian blue to prove up the bearing of the thread in the ring gage; if it is a good hand fit and shows good bearing surface it is proof the lead, angle and diameter are correct.

Internal Threads.—Internal threads that are tapped may be inspected by the "Go" and "No go" plug gage, but the tap should first be inspected by the projection method to insure correct lead, profile and diameter.

After an internal thread is smooth enough to show a good Prussian blue spotting off the plug gage, a half section can be cut away and the plug rolled into the remaining half section to show if the lead and angle are correct.

Worm Inspection.—The lead should be tested by attaching the worm to the end of a master screw having the same lead as the worm to be tested and rotating the screw so as to travel the worm past a fixed indicator bearing against the profile of the thread.

The pressure angle of worms having rack type threads should be tested by inclining the worm from a vertical line the exact amount of the pressure angle and sliding an indicator on a horizontal line with its working point on the profile of the tooth.

Worms having curved thread profiles should be tested for tooth form by running them at right angles to and with a master worm wheel and noting the bearing by the use of Prussian blue or some similar agent.

On single jobs or small quantities it should only be necessary that the worm bear properly with its mating gear unless special accuracy is specified.

HOB INSPECTION

Testing Holes.—"Go" and "No go" plug gages are to be recommended for this purpose.

Testing Keyways.—"Go" and "No go" plug gages with a key inserted are to be recommended for this purpose, as size of keyway and alignment—in relation to the hole—can be best tested by this means.

Concentricity.—Hobs, teeth, squareness of end of hob, can be best tested in ordinary bench centers with a dial indicator.

Gash Testing.—Whether a gash is radial or not can best be tested on bench centers with a plug which carries a finger that can be inserted into the gash of the hob and a sight reading taken. On straight gashed hobs it is necessary to test the parallelism of the gash with the axis of the hob, and this can be readily done by mounting the hob on bench centers and passing an indicator along the gash.

On spiral gashed hobs it is necessary to know whether the spiral of the gash is correct or not, and this can be tested either with the use of a form that has the correct spiral or a special machine made with a taper attachment that will impart the necessary spiral rotation.

Tooth Dimensions, Thickness and Depth.—The ordinary gear tooth calipers are best adapted for measuring the thickness of all types of hob teeth. Where topping hobs, or worm hobs are to be measured, the ordinary depth micrometer is recommended for measuring depth of tooth.

Tooth Form, Spur, Worm, Spline and Sprocket Hobs.—To correctly measure the contour of hob teeth, an instrument for this purpose is to be recommended. The hob should be mounted on a mandrel and a contact finger connected with an indicator should be passed along the contour of the hob tooth. Any variations in the contour will be shown on the indicator dial. Charts can be made of the theoretically exact contour desired and hob teeth can then be checked against these charts.

Lead.—The hob should be tested for lead; that is, to see whether all the cutting edges fall in the true helical path. A simple instrument is to be recommended in which a master screw with the same lead as a hob is used. The hob is mounted on the arbor end of this screw and as both are rotated at the same time an indicator can be used to detect the variation in the cutting edges. In this test, charts should be plotted and records kept of the actual condition of the hob.

Metallurgical Report

A report covering two subjects, viz., Carburizing and Case Hardening, and Heat Treatment of A. G. M. A. Carbon and Alloy Steels, was presented for the Metallurgical Committee by C. B. Hamilton, Jr. The first item under the former heading, viz., Carburizing Materials and Pots, was presented in a tentative way at a previous meeting and has already been printed in substance in these columns. The report also covered Local Carburizing, Heating and Quenching; Prevention of Shrinkage and Warpage; Prevention of Scale and Quenching Media. Mr. Hamilton in presenting the report (without reading it) stated that S. P. Rockwell was largely responsible for it.

In connection with this report five charts were presented showing the variation with the carbon content of the heating temperature required for different treatments with each of five different general groups of steels. The charts, it was explained, were based on the work of Scott of the Bureau of Standards and of Stead. An explanatory sheet will later be printed to accompany the charts. In as much as the material was not in its final shape it was decided to give it six months further consideration and act on it definitely at the next meeting. Hamilton also mentioned that at the Buffalo meeting last spring the subject of considering the choice of a new name for the product which at present has the misnomer semi-steel applied to it, was postponed for six months. The term high test cast iron is being used by some other organizations, and he asked that the A. G. M. A. help to kill the term semi-steel. The American Society for Testing Materials is preparing specifications for high test cast iron and the term is coming into regular use. The proposal that the A. G. M. A. substitute high test cast iron for semi-steel was adopted, and any specification which the A. S. T. M. may adopt will probably be accepted later by the A. G. M. A.

Another recommendation made by the Metallurgical Committee was that flanges for composition gearing be made of a red brass of from 78 to 88 per cent copper content, corresponding to S. A. E. specification No. 40. The limits on the components were to be set later. The use of cast iron flanges for such gears was discouraged. It appeared from the discussion that the trade in raw hide gearing is very much demoralized at the present time and one member thought that the proposed flange material was of too high a grade in view of the fact that "you can't get anything for those gears anyhow." Others held that it would not do to use ordinary white brass for these flanges and that the material recommended was much tougher and therefore better for the purpose. No definite action was taken on the subject.

To Show Model Laboratory

At the next spring meeting the Metallurgical Committee expects to show the members a model metallurgical laboratory for a medium sized shop. The advisability of employing a consulting metallurgist for the association was also broached. It was stated that the New England Foundrymen's Association and the American Malleable Castings Association had found a consulting metallurgist highly desirable, and the view was expressed that the A. G. M. A. could do something similar. The next meeting of the association will be held in Cleveland during the last week in April.

The meeting concluded with an automobile ride over the Chicago Boulevard System in cars furnished by the Chicago members.

New Danzig-Warsaw-Lemberg Air Service

AN aeroplane passenger service between Danzig, Warsaw and Lemberg has been inaugurated by the newly organized Warschauer Luftverkehrgesellschaft Aero-Lloyd, G.m.b.H., says Vice-Consul Bowman, Danzig, in a report to the Department of Commerce. The technical organization as well as the Danzig agency will be in charge of the Danziger Luftpost, G.m.b.H. The planes to be used are of the Junker type and heretofore have been operated in the service of the Danziger Luftpost.

Services are as follows: Monday, Wednesday and Friday—leave Danzig 8 a. m., arrive Warsaw 10:30 a. m., leave Warsaw 1 p. m., arrive Lemberg 4 p. m. Tuesday, Thursday and Saturday—leave Lemberg 8 a. m., arrive Warsaw 11 a. m., leave Warsaw 3 p. m., arrive Danzig 5:30 p. m. It is planned to establish a daily service later in the month.

The fare is but little higher than by rail, the rate at present being 42,000 Polish marks (approximately $5.50 at present rates) to Warsaw, and 70,000 Polish marks ($9.25) to Lemberg. Besides passengers, the planes carry mails and freight.

How Highways Are Being Built in the Southern States

Educational campaigns have borne fruit. Considerable road work going forward throughout the South. Motor vehicle owners pay large share of maintenance as well as part of construction costs in certain cases. Texas problem difficult.

By R. H. Bethea

PRIOR to the enactment of the Federal aid road act in 1916, the roads of the South were built chiefly for horse and mule-drawn vehicles. The truck had not been put into use in the rural districts except in rare cases, the automobile was just beginning to become a necessity on the farm, and the South had not awakened to the possibilities of motor traffic. A few States were assisting the counties in building roads, and some progressive counties were even then building wonderful systems, but the general tendency was toward building unconnected highways of value only to a few people living in the immediate vicinity.

With the enactment of the Federal aid act and the grasping of the vision it contained of a connected highway system, including seven per cent of all the public roads in the country, and according to figures compiled by several States, serving between 80 and 85 per cent of the total population, the Southern States began to wake up. They realized that road building was one of the requisites for a prosperous citizenry as well as a first aid in the education and enlightenment of their people. Little was accomplished in this work, however, until after the war and the largest proportion of the road building has been since 1920.

It is hard to visualize the size of this project viewed merely from the angle of its effect on the South. The system in the South alone ultimately will include at least 75,000 miles of finished highways. In addition several of the States are contemplating constructing additional highways, such as Tennessee, which proposes to build 10,000 miles. This and other States will bring the total now contemplated up to practically 100,000 miles.

There is no uniformity in the plans of the various Southern States either for financing roads or for their construction and quality. Every State is living up to the provisions of the Federal aid act, however, and they are pushing forward with the idea of increasing their efficiency in road building and maintenance.

It has been found necessary in every State in the South to institute educational campaigns on the value and the maintenance of roads. The southern people have a constitutional dislike for large public and bonded indebtedness. To pass bond issues for road building it has been necessary to educate them to the value of completed roads carefully maintained.

These campaigns have been carried on through road associations, booklets gotten out by the highway departments, newspapers and word of mouth propaganda. One of the main objects sought has been to teach the fact that though a road has been built up to the standard required by the Government and in accordance with the traffic using it, maintenance is necessary every day and that without proper maintenance the road will soon be in just as bad or worse shape than it was originally.

Considerable attention has been given to the improper use of roads, such as dragging plows along the highways and otherwise treating them so that even the best maintenance cannot keep them up. The great benefit of the roads to the public has been stressed.

These campaigns were found necessary in order to awaken the people to the advantages of good roads, and they are bearing fruit in practically every State. One of the most extensive campaigns is now being carried on in Texas for the purpose of getting adequate laws under which to operate and to procure the necessary bonds with which to build their proposed system of 17,000 miles of connected highways.

IN this State the laws governing roads include a definition of a "first class road," which reads: "Cleared 20 feet wide and with stumps cut off 6 inches high." All the people interested in roads are endeavoring to get amendments to laws containing such "jokers" as this.

In the South many people think that the road systems are being built primarily for tourist travel, and this gives them an antipathy to any plans that might be promulgated. As pointed out by practically all of the highway builders, nothing could be further from the truth. As the highway engineer of Alabama puts it:

"The roads are primarily being constructed for the citizens of the State, whether they live in the cities or on the farms. Any main road in the State of Alabama will, of necessity, serve a large number of farmers."

In Louisiana, however, the highway department is pushing the construction of the so-called National highways first and looking after the other roads as a secondary proposition.

The financing of roads in the South to obtain government aid is on practically a distinct basis in every State. They have some methods in common, however.

There seems to be a general tendency in the various States to put the entire burden of maintenance on the motor vehicle, either through the motor fuel tax, or through a combination of the motor fuel and license taxes.

The financing of the original construction has been carried on in a number of ways. Bond issues have been put on the market by the various States, counties and even road districts. The motor license fees in practically every

State are set aside for the building or maintenance of roads. In some States the entire amount goes to the State Highway Department, but in others a portion of the amount is given to the counties to help them carry the burden of roads.

In Texas the chairman of the State Highway Commission, R. M. Hubbard, has proposed a method of financing road construction and maintenance that includes the levying of a tax on gasoline sufficient to maintain the roads, including resurfacing and replacing drainage structures. One-fourth of the cost of the construction of roads would be met by an advalorem tax or long term State bonds; one-fourth by license fees and the other half by Federal aid. At the rate Texas is now building highways it is estimated that it will take several years to complete the system, which will cost several hundred million dollars. Texas now receives $1,750,000 a year from the license tax on automobiles for the highway department. It has a very low license tax on the 500,000 cars of the State, the average being about $3 less than the average for the United States.

IN Georgia $2,000,000 is received from license fees, which is the basis for the entire fabric of road financing. The Federal aid is being accepted in full and the State and counties are backing it up and meeting the requirements. The $2,000,000 fund is considered entirely inadequate by the engineers and the men who are backing the building of roads in this State.

Tennessee will vote on a $75,000,000 bond issue in the near future. A two cent tax on gasoline and the turning over of the entire license tax fund to the State Highway Department is contemplated in this State. It is pointed out that the gasoline tax and the license fees would finance the $75,000,000 bond issue and maintain the roads. This would put the entire burden of the State's roads on the motor vehicle owner.

South Carolina uses a different method of financing highways. In this State a very low motor vehicle license fee is charged, bringing in only $700,000 a year. This fund is turned over to the Highway Department. In addition to this there is a two mill per dollar property tax for road construction. This tax was suspended for 1921, however. The plan in this State contemplates that the two mill tax be continued and that in addition a one cent tax be placed on gasoline to provide sufficient funds for the Highway Department.

Louisiana now has a tax of two cents per gallon on gasoline, and a motor vehicle tax which brings in approximately $1,500,000 per year. It formerly levied a tax of ⅛ mill for road building, but this was repealed this year. The gasoline tax brings in approximately $1,000,000 a year. It is proposed that this entire gasoline tax be devoted to the maintenance of the roads as fast as they are completed. In addition to this the horse-drawn vehicles in this State are taxed and the proceeds turned over for highway construction. The total tax on these vehicles amounts to approximately $350,000 per year.

These methods of financing and maintenance are employed in part by all the other States in the South, together with bonds issued by counties, parishes, road districts, and other sub-divisions of the States.

Maintenance of roads is an even more important problem than construction. It is through the systems of maintenance that the public is convinced of the value of good roads and by this method the Southern States are now endeavoring to sell all their citizens on the value of a connected system of highways.

In the South are found many schemes of maintenance, all of them based upon the government requirement that the States maintain all highways on which the Federal aid has been given. They vary from the patrol system employed in Georgia and North Carolina to the mere supervision of county work in Arkansas.

In Georgia the entire system of State roads is under the State Highway Department. These roads are divided into sections of 50 miles and the sections are divided into patrols of 10 miles in length. The sections are in charge of foremen who are experienced and competent road men. The patrols are in charge of men living near or on the 10 miles they have in charge. The entire system of State roads was worked between May and September this year, and they are under daily maintenance observation for their entire length. In this way Georgia is reclaiming and putting into repair some roads that have not been completed under the provisions of the Federal act.

The roads of North Carolina also are on the daily inspection and working system. In this State the entire system of completed roads, some 5086 miles, is directly under the Highway Department for maintenance. The balance of the proposed system of roads, or about 1000 miles, is under construction. North Carolina is out in front of all the Southern States in the building and maintenance of highways.

South Carolina maintains all the roads completed in the State system through the State Highway Department. It uses several different methods of maintenance, however. Parts are maintained by patrols, similar to those employed in Georgia, others by the gang method and still others by the counties. In addition to this, a few localities have a general force which handles numerous little stretches of road, and work them only occasionally.

Maintenance in Texas is probably the largest single road question in the United States. The vast system of 17,000 miles gives a problem which would tax the ingenuity of the best equipped engineers. The funds for properly maintaining the roads by the State Department are not in hand, and they have been kept up this far by the counties with State aid and supervision. The Texas road commission proposes a tax on gasoline to furnish the money for this maintenance. It is estimated this tax would produce $10,000,000.

Maintenance in Arkansas has not been worked out to the satisfaction of the Highway Department, which has been supervising maintenance by the counties and co-operating with the counties. Educational campaigns have been carried on among the officials of the road improvement districts by the State engineers.

ARKANSAS has a State road system of approximately 7000 miles, of which 5332 are government aid. Of the mileage under the system 4330.62 miles have been graded; 2561.93 have base course completed; 2306.57 have surface course completed, and 1001.80 have not been worked. The estimated cost of Arkansas road system is $73,000,000, and $52,000,000 in bonds have been sold. In 1921 Arkansas increased the license fees on automobiles, based on horsepower and weight, and placed a one cent tax on gasoline. Seventy per cent of the license fees and 50 per cent of the gasoline tax is apportioned among the various counties for road construction and maintenance while the balance is turned over to the Department of State Lands for highway improvements and the maintenance of the department.

The highway department of Mississippi acts merely in an advisory capacity to the county organizations both in construction and maintenance, with the exception of the completed government aid projects which the Highway Department maintains with funds derived from 40 per cent of a gasoline excise tax and 50 per cent of the automobile license fees, which amounts to approximately $540,000 a year.

In Alabama the Federal aid system, comprising seven per cent of the roads, will be maintained by the State High-

way Department. Approximately 600 miles already have been taken over for maintenance, and the other roads will be included as soon as completed. Alabama got a late start in highway building because of a decision of the Supreme Court of the State that a $25,000,000 bond issue was not constitutional. The bond issue has been repassed since and is now in force.

NECESSITY for early reconstruction and improvement of road surfaces faces many of the Southern States. In Texas a road was constructed in Wichita county to the Wilbarger county line. It served an oil field when it was constructed. When its construction was under consideration some 400 vehicles passed over it each day, but now approximately 3000 vehicles, carrying about 8000 persons, use it every twenty-four hours.

This is an exceptional case, but the increase in traffic on almost any improved road is far beyond the estimates of the engineers, and this is causing the realization that much mileage will have to be rebuilt of better materials before long. The Texas Highway Commission draws the following conclusions from a study of this road and others:

"1. The enormous number of motor vehicles in use seem to be a necessary part of our modern civilization and roads must be built to carry them.

"2. Our main highways must be constructed not only of durable types, but must have also adequate widths and every care should be taken in the selection of alignments and grades, the posting of signs and warnings, etc., so as to make these highways reasonably safe.

"3. It is essential that our highways be properly maintained and sufficient funds be provided for this purpose."

SOUTHERN States are building a system of connected good roads which will aggregate 75,000 miles when completed. Here are some of the things individual States are doing:

State	Mileage Proposed	Mileage Completed	Under Construction
North Carolina	6,052	5,086.5	965.5
South Carolina	3,500	1,750	
Georgia	5,500	2,700	
Kentucky	4,000	720	347
Tennessee	10,000	4,000	
Alabama	4,000	600	460
Arkansas	7,000	2,306.5	3,694
Louisiana	7,000	2,500	750
Texas	17,000	2,600	1,900
Mississippi	3,500		

Throughout the South, prior to the recent building of roads and the advent of the great automobile and truck traffic, water-bound macadam roads were constructed. This was considered the best type of construction in those days, and mile upon mile was built, but it is said to have been found too light for heavy traffic.

Alabama has found macadam inadequate to meet present day needs. Tennessee agrees with Alabama, and very few miles of macadam have been laid in the past three or four years on heavily traveled roads. Kentucky is making an effort to reclaim a number of these roads by treating the surfaces with gravel and limestone chips, tar and oil.

A popular type of road throughout the Southeast is the sand-clay and topsoil. These roads are being built in North Carolina, South Carolina, Alabama, Georgia and parts of Florida. They are easily maintained when the traffic is not too heavy for them. In South Carolina tests show that where not more than 500 vehicles a day use a road of this type it is very easily kept up, and that when the best materials are used they will stand a traffic of 1500 vehicles a day. Ordinary automobile traffic and moderately loaded trucks have no effect on the heavier highways, except to necessitate scraping and maintenance by the usual processes.

The gravel road is used in a great many States and is found particularly in Mississippi, Louisiana, Arkansas, Texas and Alabama. These roads will stand a moderate traffic and are maintained without great trouble.

In Kentucky there is a native rock asphalt which is used to a large extent in road building. This material is particularly adapted to certain conditions in that State. A road constructed of this material, leading from Louisville to Camp Knox, was observed during the war, and as many as 4000 vehicles a day traveled over it. The road stood up exceedingly well.

Tennessee is doing a considerable amount of road building with a native chert. This material is being used where the traffic is not excessive.

Local conditions in a large part of Florida make it practically imperative for the roads in that State to be built of the most durable materials. As a result a great many miles of roadways in the peninsula proper are being constructed of brick and cement. Some asphalt and bitulithic roads are, also, being constructed. This makes progress in Florida slower than in some other States, but they have been at it longer and their roads are in good condition. In the portion of Florida immediately south of Alabama a great many roads are constructed of the sand-clay and topsoil types.

In Louisiana the Highway Department is placing greatest emphasis on national highways. The Jefferson highway covers 420 miles through this State. Improvement of 337 miles of this highway has been completed; 42 miles are under construction and 41 miles remain to be placed under construction. The Old Spanish Trail, or Southern National Highway, covers 287 miles in this State and 229 miles have been completed; 29 miles are under construction and 19 miles remain to be constructed. From this it will be seen that two roads crossing the State in different directions have been practically completed and will be finished within a few months.

Every State in the South is considering in some way taxation and control of the motor transport companies which are springing up like mushrooms. Some States contemplate a tax based on the damage they do to the roads, as well as a license fee. Other States seem to consider that they will be adequately taxed on the basis of the tonnage of their trucks and gasoline excise taxes.

The road situation throughout the South is improving. A summary shows that at the present rate of progress the system now proposed will be completed within ten years, with the probable exception of Texas. Some of the States are crying for "Good Roads, Now," and are arranging their finances so that their programs will be expedited.

Federal aid is being matched in every State and in a number of them it is being exceeded by large sums. Money is being raised in every conceivable way to build roads. Financing is being put on a sounder basis.

The work already accomplished has been of vast aid to all the citizens of the States as well as to the owners of motor vehicles and farmers in particular. Maintenance is the key to the situation, according to practically every road engineer in the South, and it is through maintenance of the roads built and building that they expect finally to reach the goal for which they are striving—a connected system of highways.

Why Trucks Can Be Sold to the Gold Coast

There are 3,500 motor vehicles in the Gold Coast, despite the fact that white population is only 3,000. Trucks are indispensable for transporting cocoa to coast. More vehicles needed. Roads are available. Gross weight permitted is 1½ tons.

By E. C. Petrie

HERE is a most interesting and informative story about automotive conditions in the Gold Coast. It tells many facts of direct value to American exporters and brings out certain information not generally known by our manufacturers.

A great cocoa industry has grown up in the Gold Coast during the last thirty years. Its success and growth have largely depended upon the ability of the planters to get their product to the seaports.

Because of the prevalence of the tsetse fly, animal transport was impracticable, and the increasing demand for labor made human porterage both wasteful and costly.

The motor truck saved the situation. Its utility has resulted in more motor vehicles than white population in this territory. Many crops are still going to waste, however, because of lack of transportation. More trucks are needed. The natives have a passion for road building and will provide the necessary highways.

IT is customary in the United States to talk of British West Africa as if it were one country and had one Government. This is not so. The West African colonies of Great Britain, composed of Gambia, Sierra Leone, Gold Coast and Nigeria, not only each have their own government, but none of them is even contiguous. Between each of them passes a wedge hundreds of miles wide, mostly of French soil. As all of these colonies lie between 4 and 14 degrees North latitude, however, they have much in common economically.

The second largest of these colonies, the Gold Coast, provides a striking commentary as to the development made possible by the introduction of the motor truck into a new country. Twice the size of Kentucky, the Gold Coast has about the same population, although the total number of whites is less than 3000.

In the later years of the last century the cocoa plant was introduced, and such has been its development that at the present time the Colony supplies the world with nearly half of its cocoa. The credit for this rapid progress belongs almost entirely to the natives.

As the cocoa trees came to fruition it became increasingly difficult for the native planters to get their produce down to Secondi or Accra. Because of the prevalence of the tsetse fly animal transport was impracticable, and the increasing demand for labor made human porterage both wasteful and costly.

Fortunately, about this time the transportation value of the motor truck came to the notice of the native, and in it he saw his chance. Feverishly he devoted himself to road construction, and rapidly he bought trucks until the slump in cocoa prices at the beginning of last year forced him to cry a temporary halt.

Despite the fact that about 3500 motor vehicles are estimated to be in the Colony, there is insufficient transport to carry all the cocoa grown, and in the more remote corners of the coast province and Ashanti many thousands of tons are left ungathered annually because of the lack of transport facilities.

Transport is also required to develop other of the Colony's industries. So much energy has been devoted to the cultivation of the main commodity that insufficient attention has been paid even to the production of necessary food crops. Consequently, food shortage is often felt in the larger towns. What food is brought in is mainly done by human porterage relays, and, as at each point loads change hands at increased rates, by the time food reaches the consumer prices are very high. It would appear that here lies an opportunity for properly organized motor transport companies to bring foodstuffs from the producing districts.

Palm and ground-nut cultivation is held back, and 100,000 tons of shea-nuts are left to rot annually, because of inadequate means of transport to the seaboard. Socially the natives suffer also, as sanitation schemes are held in abeyance and school attendance restricted.

The Government is doing its best to set a good example. At the end of 1920 the Motor Transport Department had under its charge 60 passenger cars, 160 trucks, 20 mail vans, and 4 buses. Many of these vehicles, as a result of bad running conditions in the north, plus reckless driving and inadequate service, are often out of operation for considerable periods, and even if the whole of the Department's vehicles had been in commission throughout the year they could not have coped with the merchandise stored along the service routes.

Nevertheless, much useful work was done. At Salaga five trucks carried 1900 loads over 12,038 miles in two months. During 1920, the truck loads entering and leaving Coomassie totaled 11,182, while a test conducted over 80 miles of road in Ashanti showed that 4335 vehicles covered 237,054 miles during the last four months of the same year. These figures are all the more significant in that they were taken in the less developed center and north. If statistics were available for the coastal region the figures would be larger still.

Railroad construction is proceeding as fast as available funds and labor will allow. At present there are 304 miles of line, and this will be increased by a further hundred miles by next March. Because of high freight rates, many planters prefer to use motor transport. There is room, however, for railroads in the Gold Coast and co-ordination with other services still leaves much scope for the truck as feeder for railroad, river, and shipping stations.

At the end of 1920 the Colony's motor highways were classified as follows:

Perennial roads	650	miles
Available for most of year	365	"
Dry season roads	165	"
Under construction	200	"
Periodically available for light motor traffic	2300	"
Total	3680	"

This mileage will rapidly increase, for the natives possess a perfect passion for road building. Villages off the main roads are promptly connected by feeder roads, and, when this is not practicable, villages are often taken from their old sites and transplanted astride the motor highway.

The maintenance of these roads, together with their linking up by bridges, is providing a problem for the Government. A motorable road now traverses the Colony from south to north, and Timbuctu, far into French Sudan and once a synonym for inaccessibility, can now be reached by auto from Accra, 900 miles away.

The Gold Coast Government does not mean to allow its roads to depreciate under heavy loads. Unless special permission is given by district commissioners—permission that may be withdrawn at any time—the gross weight of any vehicle, including driver and passengers, must not exceed 1½ tons. Moreover, trucks must be fitted with pneumatic tires, while twin wheels are forbidden. The result of this legislation has been a demand for trailers, and twelve months ago there were 308 of these in Ashanti alone.

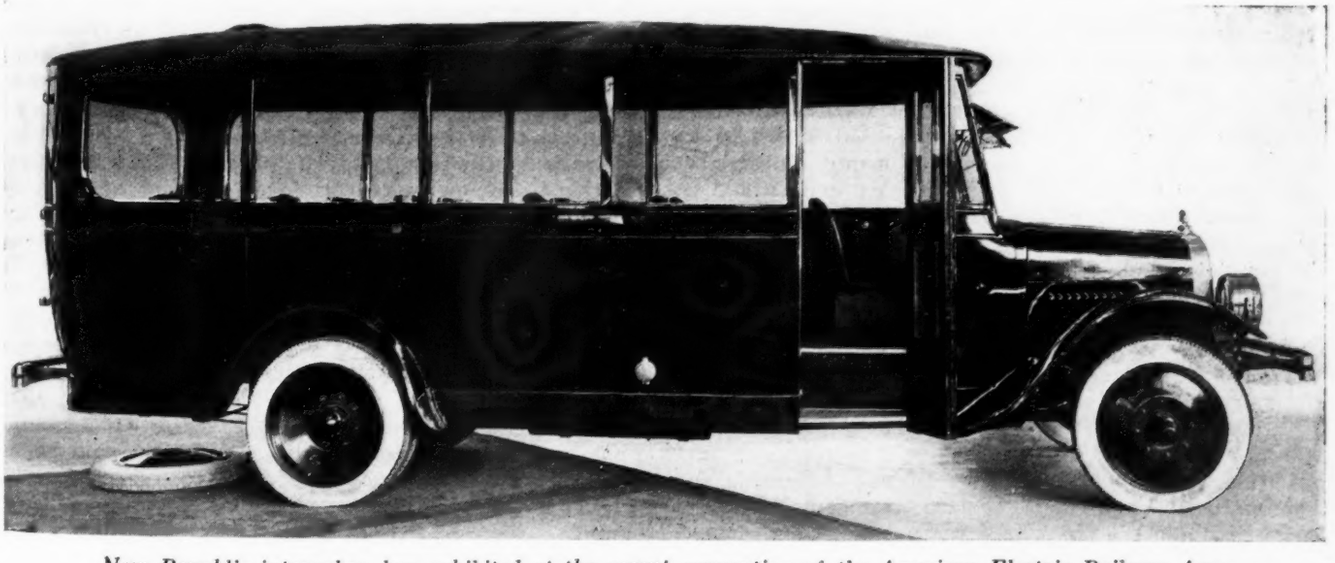
Most of the 2040 motor vehicles in 1920, valued at £1,090,352, were 10, 20, and 30-cwt. trucks. The United States was the leading supplier, but, if it is to maintain its position, it must not neglect good sales essentials.

The mother country shows signs of an overseas trade revival, and, as the Gold Coast is one of the most accessible of its offshoots, it will be one of the first to receive the attention of British makers. Moreover, its erstwhile eastern neighbor, Togoland, was, until the war, a German colony, and competition may now be expected from this quarter in view of the fact that the Teuton embargo has just been lifted. France, too, is well positioned to trade with the Gold Coast. Motor vehicles can be imported into the Colony free of duty.

The Government is endeavoring to encourage agricultural activity, and eleven stations have been established for this purpose throughout the Colony. A few tractors have been introduced for demonstration purposes, and, as the native farmers are keen and industrious they might easily be prevailed upon to adopt modern methods if irrigation schemes materialize. At present, however, little demand is to be expected, although there might be possibilities among the mahogany lumberers.

Most of the motor fuel used to-day in the Gold Coast comes from the United States. It is believed, however, that local oil prospectors will eventually prove successful, and it is reported that an area of 300 square miles in the Appolonia district, adjacent to the sea, will ultimately prove payable. Failing that, the Colony is rich in the raw materials necessary to the manufacture of power alcohol.

New Republic 19-Passenger Interurban Bus



New Republic interurban bus exhibited at the recent convention of the American Electric Railway Association. It is mounted on the Republic 175-in. wheelbase chassis fitted with a Knight engine. The body, which seats 19 persons, is made by the Bender Body Co. It has a 26 in. floor height, 72 in. headroom and is 72 in. wide and 210 in. long, inside dimensions. The tires are 36 x 5 in. pneumatics, dual in rear. Budd-Michelin wheels are used, an extra tire on a wheel being carried in compartment under rear of body

Electrical Equipment for Trucks

Editor AUTOMOTIVE INDUSTRIES:

We believe the suggested standardization of generator and starting motor sizes, with particular reference to their output and power, does not seem to conform to our conception of the purpose and usefulness of S. A. E. standardization. The standards, as outlined in the Sept. 7 issue of AUTOMOTIVE INDUSTRIES, pages 480 and 481, appear very close to the borderline of curbing individuality of development and design.

Generator and starting motor dimensions for facilitating mountings are already so satisfactorily standardized that the measure has undoubtedly saved the industry considerable expense. Heretofore S. A. E. standards have meant the definite classification of unit and mounting *dimensions* and also the definite classification of the constituents and treatments of materials for the best approved results. There has been no attempt to classify with purposes of standardization the power output of motors or the power output that a motor should have according to its type, L-head, T-head or overhead valves.

The size and power of a motor in relation to the weight of the car or truck it is to be installed in is an item that is directly up to the manufacturer and there unquestionably is a very great variety in the ratios of motor power to vehicle weights. This leads us to believe that if motor accessories are standardized as to their capacities that eventually there will be agitation toward standardized motor torques, etc. for motor sizes and vehicle weights, which would undoubtedly prove a barrier to the development of individuality in design.

Another point that would surely arise would be the predicament of motor manufacturers whose motors were unfortunately in intermediate positions between two generator or starting motor sizes. It is quite possible, that in such a case, the smaller generator or starter size would be highly desirable because of price, but it would be actually overloaded under the motor manufacturers' requirements while the next sized accessory units would be over capacity for his requirements and thus expensive to install. Such a manufacturer would really require a special generator and starter to suit his exact needs, or conversely he would need to rebuild his motor.

For instance: Carburetors have been standardized as to their dimensional and control mountings but an attempt to control their individual principles of operation or specify in a general way their requirements on a motor for useful standardization purposes would be folly. These, definitely, are points that the motor manufacturers and carburetor manufacturers must test and determine for their mutual advantages. The same arguments hold true on ignition units. Sizes or capacities of the units are not standardized but spark plug and magneto mounting dimensions are extremely simplified by standardization. These are our understanding illustrations of the trend and purpose of S. A. E. standards.

Another point. Chairman Joseph Bijur mentions, in his classification of generator capacities, the hot and cold outputs of the generators as items to be classified, evidently for the purpose of protecting the requirements of certain sized generators. It is true, of course, that the output of a generator is reduced as it becomes hotter and very careful engineering is essential in designing a generator so as not to endanger its windings in the hot stage. They are usually protected from overload by a fuse or cut-out of some sort, but we know of one electrical manufacturer whose product masters the hot and cold situation by a different and more protective method. A thermostat, capable of cutting in or out resistance is built into the generator so that as the line temperature increases the thermostat is actuated and resistance is cut in which reduces the generator output.

This arrangement permits a high rate of charge when the battery is low and just after the starting motor has been used and a safe, controllable low rate of charge when the battery is up and there is no great drain on it. Such an arrangement permits the motor manufacturer to specify a broader range for the utility of his electrical units and it also affords a more tangible protection to these units so that, as President Libby mentioned, "he need not be afraid to guarantee them." This point serves to illustrate the development of an individuality of design that would have been rendered unnecessary had the Automotive Electric Association's Standards prevailed at the time.

We would suggest that the Automotive Electric Association devote further efforts toward the dimensional standardization of their units, instead of toward their capacities. The body diameters, as well as the overall lengths of starters and generators and terminal locations are not at present standardized, that we know of, and it seems that these items would be of broader assistance to engineers than the proposed standards.

The following is a study of the proposed standards in relation to our own requirements.

On our Lycoming motors used in the Model "S," the generator speed is 96 r.p.m. per mile per hour truck speed and the No. 1 generator, recommended for standardization, is listed at 70 r.p.m. per mile per hour car speed. This generator also has a rather low output, being only 10-13 amperes hot at a listed 23 m.p.h. car speed. The generator on our Lycoming Motor is driven at a 1½ to 1 ratio, but if we consider a generator driven at crankshaft speed (on our Model "S" this would be 64 r.p.m. per mile per hour car speed) which would be the necessary speed for through shaft generators driving magnetos we could utilize generator No. 2 to fair advantage. This generator is specified in the standards at 63 r.p.m. per mile per hour car speed and its maximum hot output of 11 amperes would cover our requirements on the speed truck and if anything would be overcharging.

Our Model No. 61 motor turns 89 r.p.m. per mile per hour car speed. This ought to take the No. 3 generator

but it is stipulated in the standards that the No. 3 generator should operate at a lower speed than that of No. 2, which is 63 r.p.m. per mile per hour car speed. A generator on our Model No. 61, of course, would have to run at crankshaft speed so as to drive a magneto in tandem hook-up. The output of No. 3 generator (which is the same as that of No. 2) would amply cover the requirements of our Model No. 61.

Almost the same conditions apply to our Model No. 101 except that the motor r.p.m. per mile per hour car speed is slightly higher, being 92, which is the speed that a generator would have to operate at.

While these speeds appear to be rather high, in comparison to the stipulated speeds of the generator, we can easily understand, because of the governing of the great majority of truck motors, that the generators installed on them will be almost constant speed machines. Generator No. 2 is intended to give its maximum output at 30 m.p.h., this would make the generator turn 1890 r.p.m. On our Model No. 61, we will say that the maximum speed of the truck is 20 m.p.h. which would require a generator giving its maximum output at 1790 r.p.m., instead of 1890 r.p.m. Furthermore, the touring car motor is usually capable of turning up to about 3000 r.p.m. or say 50 m.p.h. and it also runs much higher than normal speed when the car is pulling in its lower gears, thus making a great many instances where the generator would be operated far above its maximum output r.p.m. Such instances as running above maximum output speed on a truck motor would rarely occur, in fact ought never to occur, and this places the generator's requirements within such narrow limits that we do not see how power outputs could be very well standardized for general use.

From the points cited we can see that our own products could get by by adhering to the proposed generator standards but not to our best advantage. We do feel, judging particularly from the requirements of our own products, that a generator with the specifications listed for No. 3 would cover the requirements of the majority of truck manufacturers. Examination of the motor truck specifications listed in AUTOMOTIVE INDUSTRIES of Feb. 16, 1922, shows a wide range of governed and ungoverned truck motor speeds, the extremes being 849 r.p.m. for a 2½ ton, 4 cyl. 4⅛ x 5¼ engine and 3500 r.p.m. on a 1 ton, 4 cyl. 3⅝ x 5⅛ engine. Most manufacturers, however, list their engines between 1200 and 2200 r.p.m.

We believe that starting motors would be capable of smaller classification than the generators; say, at the most that four sizes would cover practically all manufacturers' requirements. Here we have a little more leeway than with the generators, for the size of the flywheel ring gear can be changed a little. The No. 1 starting motor would be too small for our requirements on truck motors. We should recommend a motor with a capacity of at least 16 lb. in torque and capable of turning 2000 r.p.m. to give a desirable cranking speed of about 200 crankshaft r.p.m. The power consumed should, of course, be as low as possible for these results.

The No. 5 generator recommended for bus use differs somewhat from the capacity that we have developed as satisfactory. We have retained the 6-8 volt system in a 150 watt type generator, which we have found to be light, inexpensive and in more general conformity to automotive practice. This system develops ample power for lighting our 25 passenger bus.

The generator we have developed for our railway car differs from the recommended No. 6 generator in its voltage. We have decided upon a 32 volt system to conform to railway practice. The wattage output, however, is approximately the same as proposed. It seems that standardization on the railway car is a rather premature project as this branch of the "automotive industry" is as yet somewhat unsettled.

In summing up we wish to say that we are not convinced that the proposed standards would result in any great saving to the industry, especially from a viewpoint of complete satisfaction. Any material reduction in price that might be effected by adhering to the proposed standards, we feel, would be offset by many "misfits" or where the misfits were avoided by the extra cost that would be necessary in getting a generator or starter of the correct size.—International Harvester Co., H. E. Derr, Chief Engineer Motor Trucks.

Evaporating Cooling Systems

Editor, AUTOMOTIVE INDUSTRIES:

Mr. Clayden's article, "Advantages of Evaporating Type of Cooling System," in your issue of Sept. 14, covers the whole subject so fully that little more can be said. In his description of the Rushmore system, however, Mr. Clayden has not made entirely clear the purpose of the blow-off valve attached to the top of the radiator.

The blow-off valve has, really, nothing to do with the operation of the system. It is put there solely for moral effect. Owing to the higher temperature gradient, any radiator large enough to cool a given engine with water circulation will be much larger than required with the vapor or evaporating system and, so long as the fan is running, no steam will ever be discharged from the wide open overflow vent.

If, however, the engine is stopped immediately after working under a heavy load, the excess heat from the pistons and the slightly superheated water in the jackets will fill the radiator with steam and, for never more than thirty seconds, steam will be blown off. As in the Navy, it is a tradition that a motor vehicle must never show steam. So we have put on the little blow-off valve to hold back the small amount of excess steam for the few moments after the engine has stopped and the pressure never runs up to more than a pound per square inch.

It should be explained also that the considerable jacket pressure of 4 or 5 lb. Mr. Clayden has observed at times on cars equipped with the Rushmore system has not always been due to the setting of the blow-off valve, but rather to the resistance to flow of steam and water through makeshift pipe connections where water type radiators have been adapted to vapor cooling.

On most of the jobs we now have in service the outlet piping is of ample size, so that the jacket pressure rarely exceeds that of the atmosphere. On the contrary, where everything is fairly tight, we usually have an appreciable vacuum in the system, and consequent jacket temperatures somewhat below 212 deg. Fahr.

One of the advantages of the Rushmore system, which Mr. Clayden apparently overlooked, is the comparative immunity from loss of water should the radiator be injured in any way. As, normally, only the lower portion of the radiator contains steam, there is nothing but air to leak out of a puncture in the upper two-thirds of the core. Should a puncture occur in the lower, steam filled portion of the core, only steam can escape. As, with a given orifice and pressure, it takes about 180 times as long for a pound of steam to escape as it does a pound of water, a puncture that would quickly drain the usual water system would cause only a negligible loss with steam.

As most radiator leaks occur in the core, the vapor or evaporating system offers practical immunity from loss of water, notwithstanding the common notion that the "steam" cooling system must be dangerously liable to run dry.

S. W. RUSHMORE.

Production Costs More Important Than Wage Rates

Results of coal strike show futility of general adjustments in labor relations. Study in individual relationships in each plant offers most satisfactory solution. Scale of wages should be considered in relation to unit production cost.

By Harry Tipper

THE coal strike is no sooner merged into the peace of the recent truce when the formal request is made upon the operators for the consideration of new demands at the end of the present period.

Talk of the necessity of maintaining the present rate of wages or securing increases begins to crop out again among other trades.

The index of living costs shows the present position at 173 or 73 per cent above 1913 with a tendency to rise.

There is a shortage of labor already in some lines of employment and some grumbling about the operation of the immigration law, with its practical embargo on certain kinds of desired accretions to the working population.

The car loadings have reached a record and the system of business demands agreement, stable organization, with much construction in order to do the future work without too much creaking and groaning.

Labor difficulties are with us to the same extent as ever. They do not decrease in their capacity to disturb business, and place an additional burden upon the user. There seemed to be a general impression that the labor question was solved by the events of the latter part of 1920 and 1921. Many manufacturers acted upon that belief and some of them so stated in their public discussions of the matter. The fundamentals of the problem had not been studied and it was evident that no proper examination would lead to such conclusions and that any cessation of industrial problems from a labor standpoint, would be due either to the individual plant in its industrial relations or to every temporary general situation.

One of the most important indications of this belief on the part of manufacturers was the wholesale abandonment of the departments of welfare and labor relations when the scarcity of labor in 1919 was succeeded by the general curtailment of business activity in 1920 and 1921.

A good many of these welfare activities and labor relations developments were better out of the way. They had been started with little thought, operated without sufficient study, and sometimes actually were harmful to good relations between management and men. Nevertheless, the whole business fraternity dropped almost all operations of the kind when the depression came, the exceptions being few and conspicuous.

Not only that, but almost as though someone had been organizing the propaganda, discussions on the necessity of curtailing wages appeared everywhere. Speeches were quoted at length in the newspapers, conventions resolved and manufacturers frequently operated on the program arbitrarily.

At that time, AUTOMOTIVE INDUSTRIES pointed out the absurdity of abandoning any well-constructed plans and studied activities of the kind because of a temporary advantage. It also pointed out the history of wages and the general tendency for these to retain new levels once the new levels had been established.

These matters are referred to because the present conditions point to more active labor demands and the necessity of determining methods of meeting the situation more successfully than we have done in the past.

The coal operators finally acceded to the demands of the miners, largely because the necessity for coal to most industries and householders is so much more important than a slight difference in price, that the approaching stagnation of business brought to light a demand that the strike cease and coal production begin.

For the same reason, other groups of employers find it hard to stand solidly together when the effects of a strike begin to eat into the activities of business very seriously.

Individual Action Best

The manufacturer who is having difficulty with his workers is convinced of the necessity of his own action; he relies upon the sympathy of other manufacturers and the forebearance of the public in regard to the difficulties of the dispute. He does not properly estimate the reasons for this sympathy and forebearance and the circumstances which will alter it. The change in this respect was indicated very fully in the course of the coal strike by the discussions in the newspapers and the attitude of the other industries. So long as there was a reserve supply available for the continuance of production and the weather conditions made it unnecessary for the householder to accumulate any coal, the public was indifferent and the other industries sympathetic to the coal operators' position. As the time approached, however, when the reserves would be entirely wiped out, the householder began to worry about his winter supply, and the pressure for some kind of an arrangement which would permit of the opening up of coal production became much greater than the previous indifference or sympathy. If the strike had continued a little while longer, the public discussions would have shown the entire impatience of the public with the whole situation and their desire to secure coal regardless of the exact

conditions under which production was started.

The same thing is true in connection with almost all individual industrial strikes or similar difficulties. The stress of competition leads the manufacturer to seize whatever advantage he may secure rather than close his plant and lose a large amount of money. Consequently, the loss of any essential material for manufacture becomes more important finally than the question of prices and there is a pressure for peace which is greater than the pressure for any particular agreement as a condition of peace.

Reduced Wages

These conditions all operate to increase the difficulties of securing a lower level of wages, whether temporary or over the whole surface of business. In isolated instances and in some particular fields, wages are successfully reduced for a time. In other fields of endeavor, the levels are maintained and finally new levels are established as a matter of course. The employer who hopes to settle this question in combination with other employers and other general union activities, can derive little encouragement from past events. The employer who hopes, in combination with other employers to destroy the union, faces a similar situation in all industries where strong unions obtain.

Any settlement provides only a basis for new demands. In such cases, a victory for the employers is likely to lead to a new consideration. A victory for the unions is sure to be followed by new demands.

Even if no strikes eventuate, general agreements between groups of employers and workers' unions are difficult to maintain over more than short periods, are just as difficult to renew, and do not have any definite relation to costs.

That manufacturer has been well advised, who has gone forward with his own studies into the labor problem of his own organization and the possibilities of bettering conditions in his own plant.

Even though the results of his efforts have been discouraging and apparently have not attained the things he hoped, he has a much better opportunity to make peace with his workers and keep it than the employer who has made no such studies but intends to work through a group of employers in general sessions with the unions.

High wages do not mean a high cost of production necessarily. They do mean a higher cost of production if the production pace averages the same. Wherever the allegiance to the union is more effective than the belief in the individual organization, higher wages do mean a greater cost to produce, but in a number of plants in this country, high wages are being paid on a reasonable production cost by more effective management.

The most desirable production system is the one whereby high wages can be paid and low production costs obtained. This enables the worker to purchase more largely out of his surplus because the cost of living is not so nearly related to his maximum earnings. Wherever plants have been able to manage affairs so as to pay a high rate of wages without increasing and in many cases reducing production costs, their contribution to general prosperity is much beyond the value of their product.

The attention of employers and managers of industry should be directed to the question of production costs and the elements entering into production efficiency. Entirely too much of the discussion is devoted to the question of wages and hours without consideration of production pace and maximum development of organization. Between the most efficient plant in any industry and the less efficient plant, there is a wide variation in costs. This variation is always much greater than the variation in wages. Frequently, there is no variation in wages at all, the difference in production costs arising out of more efficient management of the plant through its understanding of the labor necessities and development of the equipment.

This study, of course, must be an individual study related strictly to the individual plant. Information of value in conducting the study may be secured by the examination of conditions in other plants, but the study itself must be undertaken in order to apply it to the particular operations and conditions. Regardless, therefore, of the general situation, the most important job in connection with labor costs, as studied in the individual plant, is concerned with production and production effect.

This study should include not only the direct labor but the indirect labor classified as overhead, so that the organization may be maintained at the high production pace and consequently secure good wages without such wages increasing the production costs.

General agreements between groups of employers and groups of workers affect wages, hours, etc., only. They do not affect conditions of management or organization. They do not look to production costs or production speed. They are utterly incapable of bettering the production condition or the reduction of the avoidable wastes.

Conditions in the coal mining business illustrate this. Engineers and experienced men in this field have pointed out great possibilities of improving the organization and capacity of the business, but the operators and unions continue to argue about wages and hours, while the public need is for organization and efficiency.

The general agreements between groups of employers and groups of workers tend to introduce privileges and limitations which act adversely upon the production possibilities so that high wages are not accompanied by a decreased production cost. In Great Britain where the custom of treating as between groups of employers and unions has obtained for many years, the number of rules and regulations relating to production is very large and practically controls the possibilities of production volume per man in some lines of industry. It is not likely that such general agreements will operate in any other way in the future and consequently they do not increase production efficiency or improve the economic position particularly.

Finally, in some way or other, the management of the individual plant will be obliged to take the full responsibility for the organization of the plant and the production value of the labor therein.

UNFAVORABLE economic conditions have reduced Swiss automotive trade in both imports and exports. A loss of two-thirds was experienced in exports for the first half of 1922, as compared with the first half of 1921, while imports fell off about half. The import drop came despite the comparatively high value of the Swiss franc. This fact gives some measure of the strenuous character of economic disturbance, since the Swiss automobile manufacturing industry itself is far from being in a position to supply the present automotive needs of the country.

Imports from the United States have increased at the expense of Germany. Swiss trade figures for the first six months of 1922 as compared with the same period for 1921 were:

	1922	1921
Exports.....	1,200,000 fr.	3,300,000 fr.
Imports.....	13,300,000 fr.	28,100,000 fr.

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The AUTOMOBILE
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Make Them Mean Something

THIRTY new S. A. E. standards have just been finally adopted. These are the standards which were approved at the last summer meeting. The letter ballot, as is usual, has resulted in an overwhelming majority in favor of nearly all the recommendations approved by the standards committee.

Will executives and designing engineers of the industry remember two months from now that these new standards have been adopted? Will they put into use these simplified practices that they have had a part in making? Or will it be possible in future years to apply to some of these new standards the same phrase that has been used of some others in the past. They are fine in themselves but the industry fails to make use of them.

Less than 10 per cent of those eligible to vote cast a ballot on any of the proposals. The total number voting on any one proposal did not exceed 194. The total number of members eligible to vote is in the neighborhood of 3000.

It was not to be expected that an extremely high percentage of possible votes would be returned. Many members know the careful work done by the standards committee and simply rely on the fact that the recommendations made will be accepted whether they vote or not. But there is undoubtedly a certain proportion of pure indifference included in the 90 per cent of non-voters. It is largely indifference which prevents wider use of standards.

Executives can save thousands of dollars a year, make their service easier to handle, at the same time preserve all the desirable individuality of their product by getting behind the movement to put standards into actual use more widely. The chief executive of every organization can profitably ask for a report from his engineering department on the extent to which they are using standards and an explanation of any failure to use them in cases where standards are available.

Guessing Market Probabilities

RESEARCH departments are essential parts of modern business. Automotive companies are finding imperative the necessity for study of future markets.

But the compilation and use of statistical research data are of comparatively recent date. Interpretation of such material, especially, is still in the experimental stage. Mistakes made in using research departments and statistical data have inclined some executives to disparage all work of this character. The difficulty lies, not in the essential idea of basing future procedure on facts insofar as possible, but in the misuse or misinterpretation of those facts.

Collection of research data is not an end in itself. It does not and never will take the place of judgment and constructive thinking in the operation of a business. Rather, it increases the scope and necessity for sound judgment. The research department should be used to provide for the executive those facts which he needs in order to make proper decisions.

"Any business judgment is as sound as the facts upon which it is based," said Henry S. Dennison, president of the Dennison Manufacturing Co., the other day at a meeting of the Business Paper Editors. A proper assembling and study of facts are essential to sound judgments, Dennison believes.

Some business decisions must be taken before complete facts are available, but the proportion of such decisions should be reduced to a minimum. Executives should strive to take the guess out of business to the best of their ability.

Research departments are needed to provide material upon which to base plans. They supplement very materially, but in no sense replace, the necessity for judgment.

Practical Theories

"MEN do not begin to act upon theories. It is always some real danger, some practical necessity, that produces action and it is only after action has destroyed old relationships and produced a new and perplexing state of affairs that theory comes to its own. Then it is that theory is put to test."

This statement is made as a result of a careful and comprehensive study of the history and actions of man since the beginning of time. It is made by H. G. Wells in his "Outline of History." An examination of the past indicates its essential truthfulness so far as the past is concerned. But it need not hold true of the future.

Executives in the automotive industry are beginning to see possibilities for profit in acting on the basis of sound theory before compelled to do so by dire necessity. Some of them are practicing this new doctrine in their handling of industrial relationships. They are attempting to adjust the relation between the worker and his job in a satisfactory manner long before any pressure for such adjustment is exercised by the worker. By so doing they are finding the adjustments easier and less expensive to make and are securing the benefit of mental as well as physical cooperation from employees. They are studying personnel problems carefully whether trouble has appeared on the horizon or not.

Others are making similar studies and are developing similar sound theories along marketing lines. They are trying out theories that look practical and useful before compelled to "try something" by economic forces. This studied investigation and experiment gives them ample time to modify and adapt various phases of the original theory to practical needs. They are making their market policy adjustments without the haste and inaccuracy necessary in changes forced by circumstances.

Preventing Oil Pumping Troubles

MANY modern engines, especially those used in lower priced vehicles, suffer from excessive lubrication so far as the cylinders are concerned, with the result that much oil passes the pistons, fouls the plugs and tends to cause accumulation of carbon. This trouble, commonly known as "oil pumping," is by no means confined to old cars with badly worn cylinders and bearings. It is due, in the case of new cars, to two main causes—faulty design and careless manufacture.

In general oil pumping results from an excessive amount of oil being thrown on the lower portion of the cylinder barrel. With properly designed pistons and rings this excess oil is returned to the sump without causing pumping troubles, but with faulty pistons and rings an excessive amount is quite certain to reach the combustion chamber. It would thus seem to be self evident that it is desirable to prevent too much oil from reaching the cylinder barrel in the first instance.

In the case of splash lubrication this can be accomplished by making arrangements whereby the oil level is properly maintained under all conditions. The portions of the rod which dip into the lubricant must, of course, be correctly proportioned. In one case we know of the use of connecting rod bolts which were longer than necessary gave rise to a lot of pumping trouble.

With pressure lubrication much depends upon proper location of the oil holes in the crank pins. The intelligent use of baffles arranged to deflect most of the oil thrown from the bearings away from the cylinder bore is also understood to produce the desired result, but ordinary flat baffles fitted at the base of the cylinders are said to have aggravated the trouble in other cases.

Too much emphasis can hardly be placed upon the importance of a perfectly true cylinder bore and of well-made and well-fitted pistons and rings. Evidences of careless manufacture of these parts are all too frequently found. A small sum spent during manufacture in better finishing cylinder bores and in the careful selection and fitting of rings, will, we believe, pay the car and engine builder many fold, not only in preventing oil pumping and its attendant evils, but in general improvement and satisfaction in the use of the finished product.

Shifting Emphasis in Production

AUTOMOTIVE production is entering a new phase. The fact that the first S. A. E. production meeting is about to be held is not without significance. Production is passing from its period of radical and revolutionary improvements to a stage of minor refinements of considerable importance.

Ten years ago a production man might gather some valuable and practical information by a general survey of another plant or by reading a general description of its operating methods.

To-day he must examine intimately the details of operations. To get anything of practical value from his fellow production man, he must discuss mutual problems and ask questions about details.

Production progress of the next ten years may be equal in importance and efficiency to that of the last ten, but it will be different in character. It will consist of an improvement in a multitude of small matters rather than in a few radical changes in major operations.

Attention must be concentrated upon a closer analysis of production details and a studied effort at small refinement, if production is to make the strides in increased efficiency which will still be demanded of it during the coming decade.

2,000,000 Year Assured for 1922

1,873,000 Produced in Three Quarters

Will Need Only 403,000 to Equal High Record That Was Established in 1920

NEW YORK, Oct. 16—The automotive industry has entered the final quarter of the year with assurances that no matter what may happen to retard progress during this period the total production of cars and trucks for the twelve months will surpass the 1921 aggregate and from all indications will forge ahead of the record established in 1920, the banner year in the industry.

What the industry has accomplished in production so far this year is evident from a comparison of the totals for the last two years and for the first three quarters of 1922.

In 1920 there were produced 2,276,000 cars and trucks of which 1,928,000 were built in the first nine months, the slump which affected all lines of business seriously hitting the industry in the last quarter. The total output in 1921 was 1,668,550 and in the first nine months of 1922, 1,873,000. To reach the production record of 1920 the industry must produce 403,000 cars and trucks in the next three months, which is less than 60,000 under the total of the third quarter of 1920 when the industry was suffering its most severe setback, and only 68,000 more than for the third quarter of last year, which was not an exceptional period.

Work on High Schedules

There is little question but that this figure will be reached and that 1922 will be another 2,000,000 year. Ford, which reduced its total in September through the closing of its plants, has come back with a 5000 daily production schedule and the majority of other plants are working on high production programs. Reports of parts makers that orders are being placed well in advance indicate the purpose of the car manufacturers to keep output at a high mark.

These manufacturers, however, are ready to start the tapering off process in operations as soon as a decline in sales comes in a sufficiently large volume to warrant it. So far, October has shown no signs of more than a slight falling off in sections widely separated. Interest has been sustained until the industry has started

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Business in Brief

NEW YORK, Oct. 18 — Cool weather has had its effect on trade and industry in that it has bolstered up retail business appreciably, while it has caused wholesalers to become apprehensive of transportation congestion, which has caused them to buy liberally.

Car shortages seem to be the chief cause of complaint, especially in the steel industry. Despite this, prices of pig iron are reported easing in the West. Car loadings for the week ended Sept. 30 were the largest since Oct. 22, 1920, with 30,988,381 or 9.2 per cent over last year and only 3 per cent above the peak total of Oct. 15, 1920. This is 15,090 more than the preceding week. Transportation is held up by the lack of power, it would seem, many locomotives being in need of repair.

There is great activity in wheat movements, more than 70,000,000 bu. of spring wheat having left farms in the Northwest, while 120,000,000 bu. have been moved in western Canadian provinces. Corn harvest is progressing.

Railroad earnings decreased in August, but this was to be expected because of the strikes and the 10 per cent reduction in freight rates. According to the Interstate Commerce Commission's reports, the railroads failed by more than $66,000,000 to earn 6 per cent on their valuation in August. Operating revenues were $473,877,000 and expenses $387,150,000.

There was considerable activity in the stock market caused by announcements of big dividends like the Standard Oil Co. of New Jersey's announcement of a 400 per cent stock dividend. Money was firmer, exchanges strengthened slightly, bonds were fairly active and steady while commercial paper discounts ruled unchanged. Business failures were 366 as compared with 314 the preceding week.

Bank clearings for the week totaled $6,323,982,000, a loss of 18.7 per cent from the previous week but a gain of 15.8 per cent over the same week last year.

2,500,000, Output in 1923, Willys Says

Of This 1,900,000 Will Be Replacements—This Year's Production, 2,250,000

CLEVELAND, Oct. 19 — John N. Willys has given an answer to the question of what will happen next year in view of the unprecedented number of cars that have been sold in 1922.

Willys answer is: "I say there will be between 2,500,000 and 2,600,000 cars produced and marketed in 1923, and of this number 1,900,000 will be replacements. Some of the companies which are in the field to-day will vanish during this coming year. But there will be automobiles sold. A year ago we were laughed at when we made the prediction that automobile production for 1922 would total 2,250,000. At the end of this year the figures will show an output of between 2,250,000 and 2,300,000."

This statement was made by Willys when he came to Cleveland last week to help Walter F. Wright start his new company here on the campaign for Overland and Willys business. Wright recently took over the business of the Toledo corporation in this city.

Good Service Essential

Speaking to a group of business men associated with Wright, Willys said:

The automobile industry is a big business. It is a big job to make and sell 2,500,000 motor cars and trucks. The organization having manufacturing and merchandising policies that are right will come in for its good share of the business, but the greatest determining factor in the industry to-day is service. A manufacturer can build the best car in the world and it will fail unless he has provided that its owner shall have good service and at a price that will make him a booster as well as a customer.

When the owner of a motor car knocks it, and his kicks are justified, the reason generally is poor service, and yet the manufacturer is the one who suffers. So we are paying more attention to service to-day than at any time in the history of the company.

How does this apply to the manufacturer? In order to get the right kind of distributing and service organizations he needs to have franchises that are worth holding and he must have a product which the people will want to buy. I have heard a lot about good salesmanship, and my definition of good salesmanship is getting hold of a product having sufficient merit for the public to want to buy it. That's where the manufacturing comes in.

Willys paid a compliment to Wright. The latter in outlining his policies said that his first concern was to surround himself with men who would go more than half way in meeting the demands of Willys Overland car owners.

New Ford Cut Puts Phaeton at $298

$50 Taken Off All Models Except One

Four-Door Sedan Not Lowered in Price—Truck Affected But Not Tractor

DETROIT, Oct. 17—Effective to-day, the Ford Motor Co. has announced a reduction in prices for the second time this year. Fifty dollars has been cut off the list on all Ford models, with the exception of the tractor and the recently announced four-door sedan, which will remain at its original price of $725.

Under the new list the five-passenger open car will sell for $298, the lowest it ever has been. Originally it was listed at $360. That was in 1916, but in 1920 it had reached the peak, $575. Since then the price has been reduced gradually—to $440, $415, and $355 in 1921, and on Jan. 1, this year, $7 was taken off the $355 list. Now comes the sensational drop to $298.

The new Ford prices, without starter and demountable rims, are as follows:

	Old Price	New Price
Chassis	$285	$235
Runabout	319	269
5-pass. phaeton	348	298
Truck chassis	430	380
Coupe	580	530
Sedan	645	595

Edsel Ford Assigns Reasons

The reductions are made possible by increased production and the acquisition and operation by the company of many of its supply sources, according to a statement by Edsel B. Ford, president. The new prices represent a cut of almost 100 per cent from prices prevailing in March, 1920.

Ford said:

The revision in prices is the result of the increased volume of business which our company has enjoyed during the present year and also to the fact that we now own and operate many of our own sources of raw material which enables us to continue increasing the quality of our product and at the same time keep the price so low that Ford cars are within the reach of everyone.

Our production for 1922 already is in excess of 1,000,000 which has been an important factor in bringing down costs, and our present daily output is averaging better than 5,000 cars and trucks which means a complete Ford every five and a half seconds of each working day. It is in anticipation of this continued demand that price adjustments are being made in order to keep in effect the policy of selling Ford products at the lowest price consistent with quality.

Quality will continue to be the prime consideration in the building of Ford cars. As our business has increased we have constantly increased our equipment and manufacturing facilities so that this price reduction merely reflects the progressive methods which come as a result of increased volume.

This reduction is the sixth since March, 1920, and brings the price of the Ford phaeton from $575 to the present low level of $298. Corresponding reductions have been made on all other types. The

(*Continued on page* 795)

Younger Generation, Demanding Modern Touch, Influences Style of Car Produced

By Carroll Downes

Vice President, Durant Motors, Inc., President, Durant Motor Co. of Michigan, and President, Star Motors, Inc.

DETROIT, Oct. 17.

SOME idea of the extent and scope of the automotive market may be gleaned from the fact that already Star Motors has accepted orders for all the cars it can build in its first calendar year.

Our estimated production for the first year, based upon the number of engines that can be built, is 231,000. Orders for 505,000 of these vehicles are in our files in New York, eliminating those of which we are doubtful we have over 200,000 left which will take practically every car we can make.

Buyers of motor cars are demanding more style and individual characteristics in their purchases all the time. Manufacturers who are successful in interpreting the desires of the people will always be busy. We have seen and are seeing instances every day where the product of the more standardized manufacturer is passed up in preference for a car from a lesser known source which has been given a more modern touch.

This is largely due to the influence of the younger generation which wants more dash in its motor cars. Sport cars are not a novelty. They represent a definite taste on the part of many thousands of buyers. They will continue to hold an important place in the manufacturing schedules of our factories and will in time, I believe, usurp the place now held by the present standardized open models.

In addition to successful interpretation of public desires, the automobile manufacturer who will be successful must be organized along the most economical lines. Every man in an organization must have a definite place to fill. There are many companies today maintaining expensive positions and departments which might easily be dispensed with. Where such conditions exist a company cannot compete successfully.

The dealer situation about the country as we find it is good. We have doubled our dealer organization since the first distribution of Durant products was started and have been compelled to hold up opening all of the territory in the United States because of lack of sufficient production. The foreign field has been practically untouched for this reason. With all factories operating we shall be enabled to open the way for Durant representation in every part of the world.

The railroad situation delayed us in our manufacturing plans somewhat but this condition is now improving through the splendid work on the part of executives. Though the industry was hit by the car shortage, we had splendid cooperation from railroad officials and because of this came through the trying strike period with much better service than might ordinarily have been expected. The industry owes the railroads its thanks for their efforts. With the peak of the crop movement passed conditions should rapidly right themselves.

MERCER DIRECTORS

TRENTON, N. J., Oct. 17—Directors of the Mercer Motors Co. have been elected as follows: J. F. Brice, A. S. C. Fiske, W. M. Swain, E. D. Meyerowitz, C. A. Bona, W. G. Kimball, J. L. Kuser, J. L. Kuser, Jr., E. C. Stokes, N. A. K. Bugbee, G. P. Smith, J. W. Richmond, R. N. Barnum, W. A. Smith and H. D. Fogg.

Commercial-Continental Plan Has Been Ratified

NEW YORK, Oct. 16—The proposal whereby the Commercial Credit Co. of Baltimore was to acquire control of the Continental Guaranty Corp. of New York, has been ratified by the stockholders and the exchange of stock will take place in Baltimore on Oct. 25. While both concerns will retain their identity, after Nov. 1 they will operate under the control of the Baltimore company, according to the announcement.

These two finance organizations have been prominent in the handling of automobile credits and the New York corporation numbers John N. Willys and J. D. Dort, automobile manufacturers, among its directors.

Stock Issue Legal, Goodyear Answers

Contract with Leonard Kennedy Not Unfair, Company Says, Replying to Suit

AKRON, Oct. 18—Answers and demurrers to the four suits filed two months ago in the common pleas courts of Akron, by Laura L. T. Weiss of Cleveland, attacking the legality of the refinancing of the Goodyear Tire & Rubber Co., have been filed by the Goodyear company and its co-defendants including Leonard Kennedy & Co. of New York, the A. G. Becker Co. of New York and by other financial syndicates represented in the Goodyear reorganization.

Leonard Kennedy & Co. seeks to have the service of the summons upon it quashed on the ground that it is not within the jurisdiction of the Akron court.

Mrs. Weiss, in her four separate actions, charged the illegal issuance of 10,000 shares of management stock and the payment of $10,000 a year to each of three trustees of such stock; charged a dissipation of the Goodyear company's assets in paying Leonard Kennedy & Co. $250,000 a year for five years plus 5 per cent of net profits per year between $10,000,000 and $20,000,000 for the services of E. C. Wilger, as president, and of other officers, and claimed as irregular the payment of a bonus on prior preference stock and first mortgage gold bonds issued and sold by the syndicate negotiating Goodyear's $80,000,000 refinancing last year.

Sets Forth Accomplishments

Mrs. Weiss is the holder of 50 shares of Goodyear common stock and 100 shares of Goodyear preferred.

The Goodyear answers to the four actions set forth the accomplishments of the company under the new management which succeeded the Seiberling regime. They claim all the securities were properly authorized by the stockholders and were legally issued, and hold that the contract with Leonard Kennedy & Co. is not unfair or unreasonable under the circumstances. The documents state that the Goodyear company on Jan. 1, 1921, had an indebtedness of $64,000,000, and that its losses for the 14 months up to March, 1921, were $14,000,000.

BUYS JEFFERSON PLANT

JEFFERSON, WIS., Oct. 16 — A concern known as the National Vacuum Street Sweeper Co. has purchased from the receiver the entire property of the defunct Jefferson Rubber Co., which was established here about three years ago to manufacture tires, tubes and mechanical rubber goods. A new plant, representing an investment of about $100,000, was erected and equipped. This will be remodeled and retooled at once for the production of motor-driven street sanitation machinery.

FRENCH RAIL TRUCK PLANS ARE AVAILABLE

WASHINGTON, Oct. 17—Plans and specifications of several types of motor truck chassis and engines, now being used on railways in France, have been received by the Bureau of Foreign and Domestic Commerce. They will be loaned to automobile manufacturers upon application for miscellaneous exhibit No. 268, automotive division of the bureau.

According to the plans there is a growing demand for this character of equipment. The Renault Co. is now manufacturing a gasoline-driven locomotive for the standard French railroad of 1.44 meters, which is provided with an engine of 40-60 hp. and weighs 19 tons empty. This type of railway transportation, it is stated, is gaining ground in France.

Templar Plant to Reopen When Inventory Is Taken

CLEVELAND, Oct. 16—The work of taking an inventory is still in progress at the plant of the Templar Motor Co., which was placed in the hands of Receiver T. L. Hausman last week by Federal Judge D. C. Westenhaver.

The plans provide for the re-opening of the plant immediately after the inventory is completed. It will be operated under the management of the receiver, who was given such authority. While the plant is down, dealers and distributors will have sufficient cars from the stock on hand when the Federal Court took over control of the plant to supply the wants of customers.

When the institution does re-open it will have sufficient working capital to carry on plant operations, as authority has been asked to borrow money for this purpose. The company also will have the protection of the court. Plans for the reorganization are going forward rapidly.

Ford to Quit Manchester; Buys Site at Southampton

LONDON, Oct. 6 (*by mail*)—After negotiations extending over several months, the Ford Motor Co. in England has concluded arrangements to acquire 20 acres of land alongside a deep-water quay at Southampton for the erection of a plant which will displace the one now at Manchester, where the lease expires in a few years' time.

The new plant will form the headquarters for European distribution, and it is hoped to have the building completed and the plant in operation within 12 months.

Chalmers Expansion Likely to Come Now

First Development in Reorganization Movement Marks Action of Noteholders

DETROIT, Oct. 18—The consent of Chalmers' note holders to the plan by which the company will become an integral part of the Maxwell Motor Corp. properties marks the first development in the reorganization movement, according to President W. R. Wilson of Maxwell. Several more weeks will be required to work out the final arrangements, he said, and when these are complete the company will announce its plan for the development of the Chalmers line.

Production of Chalmers for the past six months has been on a limited scale, owing to the determination of Wilson to hold its operation to a basis in keeping with its financial position. This scale of operations was lower than sales requirements and was not extensive enough to meet its financial obligations, though sufficient to cope with ordinary operating expenses and yield a profit. Under this operating plan, the large stock of materials on hand when the plant came under Wilson control has been practically cleared out.

To Follow Maxwell Plan

Some time ago Maxwell officials outlined a plan for the operation of Chalmers should their organization arrangements be approved. This was not disclosed, but is understood to follow the plan used in the development of Maxwell whereby this car came in for unusual demand and became one of the big money makers of the industry almost over night. This was accomplished largely by the popularity of its models. It is understood a number of new models will be added to the Chalmers line.

The impression that the Chalmers' plant in Detroit might be discontinued with the vesting of title rights in the Maxwell organization has been denied on several occasions by executives. Recently a bid was entered by Maxwell for the Chrysler plant at Elizabeth, N. J., and it was regarded as indicating Maxwell's desire to locate an eastern plant for the manufacture of both cars, with the Maxwell plant in Detroit making both cars for middle west and western business. Wilson at that time said Maxwell wanted the Chrysler plant because it was regarded a good buy at a certain figure.

PAN MOTOR RECEIVERSHIP

ST. CLOUD, MINN., Oct. 16—Edward E. Clark and R. E. Gale have been appointed receivers for the Pan Motor Co., following the filing of a suit for $30,000 against the concern. Assets, apart from deferred capital stock and good-will, are given as $2,633,385, with liabilities of $506,061.

New Capital to Aid Stutz Development

Stockholders Will Be Asked to Authorize Issue of $1,500,000 Bonds

NEW YORK, Oct. 16—New financing of the Stutz Motor Car Co. of America, Inc., is proposed to furnish money for a campaign of development and improvement in the company's business. In order to secure the new capital a meeting of stockholders has been called for Nov. 1 to authorize an issue of $1,500,00 face value of the 15 year 7½ per cent convertible sinking fund gold debenture bonds of the company, of which it is intended to issue $1,000,000 face value at present.

The stockholders also will act on a proposed increase in the authorized number of shares of the company by 63,000 shares. Of this amount 33,000 shares are intended to be set aside to provide for possible conversion of the bonds, and the remaining 30,000 are intended to be offered to stockholders at $20 a share in the proportion of three shares of the new stock to 20 of the old. Both the $1,000,000 of debenture bonds and the 30,000 shares of stock have been underwritten.

The company explains that the convertible bonds also will be offered prorata to stockholders. The basis of conversion will be 33 shares of stock for each $1,000 bond.

duPont Again Locates Factory in Wilmington

WILMINGTON, DEL., Oct. 16—Originally established in Wilmington, duPont Motors, Inc., now located at Moore, Pa., near Philadelphia, is to be moved back to Wilmington. E. Paul duPont of this city is president and chief owner of the company, which manufactures the duPont car.

The company expects to occupy a group of buildings in the double block bounded by Market, Lammot and Twenty-second Streets and Vandever Avenue, formerly occupied by E. I. duPont deNemours & Co., for the company's advertising division. Originally this was a textile mill. The Moore plant will be gradually moved to Wilmington.

The company was formed by duPont several years ago to produce high-grade, high-speed cars, ranging in price from $3,000 to $4,000. The company is making slight changes in the models of its cars, and production on a normal scale will not be started until these changes have been completed.

SUPREME MOTORS BANKRUPT

CLEVELAND, Oct. 17—With liabilities of $1,067,099 and assets of $238,653, the Supreme Motors Corp. of Warren, Ohio, has filed a petition in bankruptcy in the Federal court.

FILMS TO TELL STORY OF AMERICAN ENGINE

WASHINGTON, Oct. 17—The story of the American automobile industry, through the medium of films, which have already been made by the Government in the Studebaker plant at South Bend, Ind., is to be augmented by an additional film, telling the story of the American engine. These films will be distributed by the Bureau of Foreign and Domestic Commerce in foreign countries, wherever there is a potential field for the American-made automobile.

"The Story of a Valve in Head Motor" will be filmed by the motion picture division of the bureau, under the management of M. F. Leopold. This film is being made possible through the financial support of the Buick Automobile Co., the bureau announces. The Government also plans to make another film on "The Story of the Internal Combustion Engine" as soon, Leopold says, "as the financing of the film can be arranged."

Work on the film of the "Valve in Head Motor" was begun this week in the Buick factory at Flint.

Hendee Sales, $3,000,000 for Year Ending Aug. 31

SPRINGFIELD, MASS., Oct. 19—The Hendee Manufacturing Co. lost approximately $1,100,000 owing to the industrial depression, inventory depreciation, high operating expenses and heavy overhead, according to the report for the fiscal year ending Aug. 31, 1922. Despite this loss, the report says that the concern is on a sound financial basis, having an earned surplus of $936,192. The inventory has been adjusted, overhead reduced and administrative and selling departments reorganized.

Prices have been reduced to a pre-war level, and with improvement in general business and better exchange rates, an increase of orders has ensued and the outlook for the future is encouraging. Sales, less returns and allowances for the year, are given as $3,097,480. Assets are given as $12,584,227 and liabilities as $648,035. There are outstanding 10,000 shares of preferred 7 per cent cumulative capital stock amounting to $1,000,000 and 100,000 shares of common stock amounting to $10,000,000.

FILLMORE A. DRAKE DEAD

NEW YORK, Oct. 14—Fillmore A. Drake, known in rubber circles for many years, died at his home in East Orange, N. J. After being associated for some time with the Goodrich Rubber Co. and G. & J. Tire Co., he became president of the Berrodin Rubber Co. of Philadelphia. More recently he was sales manager of the Howe Rubber Co.

Elgin Plans Go on Under Receivership

Efforts Will Be Made at Reorganization—Petition in Bankruptcy Filed

CHICAGO, Oct. 13—An involuntary petition in bankruptcy against the Elgin Motor Car Corp. of Argo, Ill., a suburb of Chicago, was filed in Federal court here yesterday by three bank creditors. Fred E. Hummel was appointed receiver.

It is stated that the plant will be continued in operation and that efforts to effect a reorganization will be continued.

The company had been in the hands of a creditors' committee since Sept. 30, and efforts were being made to raise additional capital to continue operations. Since Oct. 2 the corporation has been under the management of R. W. Phelps, a representative of the creditors' committee, and the official personnel had been greatly reduced to save expense. Charles S. Rieman is president of the company.

Petitioners for the receivership were the Central Trust Co., Greenebaum Sons Bank & Trust Co. and the Century Trust & Savings Bank, each with a claim of more than $10,000. The petitioners claim the company's liabilities are more than $1,000,000. Counsel for the company asserts that liabilities are $600,000 and that assets are more than $900,000.

The Elgin company was organized in 1915 with a capital stock of $1,500,000, which was raised in 1920 to $5,500,000. There were about 17,000 stockholders, the stock having been sold widely to small investors.

Committee Organized by Holmes Bondholders

MILWAUKEE, Oct. 16—Wisconsin holders of securities of the Holmes Motor Co., Canton, Ohio, have formed a protective committee, following the receivership proceedings instituted against the corporation. It is stated that approximately $250,000 of the Holmes company's two-year bonds, sold with a bonus of common stock, were disposed of in Milwaukee and immediate vicinity.

George F. Moss, president of the Western States Envelope Co., Milwaukee, has been appointed chairman of the committee, which has asked all holders of securities to deposit them with the First Wisconsin Trust Co., Milwaukee, while efforts are made to recover.

The committee had an appraisal made of the Holmes property, which reveals assets of $600,000, not including the worth of valuable patents on its air-cooled engine design. It is stated that while the issue of two-year bonds was in the sum of $750,000, only about $400,000 was actually sold and more than half of this amount was sold in Milwaukee.

Ford Surveys Power Sites in Wisconsin

May Establish Hydroelectric Plant to Provide Materials for Tire Factory

MILWAUKEE, Oct. 16—Reports have come from a half dozen communities in Wisconsin, where large developed and potential hydroelectric generating capacity exists, that Ford is making surveys with a view of purchasing water power sites. In connection with these reports come others to the effect that the Ford interests plan to establish a new hydroelectric plant for the purpose of a contemplated zinc oxide manufactory in Wisconsin to provide a supply of materials for a proposed tire factory. Nothing definite has grown out of these rumors and reports, however.

Color has been lent to the reports by the information coming from Platteville, which is the center of the extensive southwestern Wisconsin lead and zinc mining district, that for six months representatives of the Ford interests have been mingling with owners, operators and miners of zinc. It is stated that options have been taken of certain proved zinc mining lands, but that the name of Ford has not appeared in any of these negotiations.

While reports of Ford surveys of power sites have come from widely scattered points as far north as Rusk county, a long distance from the zinc mining district, one comes from Prairie du Chien, at the mouth of the Wisconsin River, which is only a short distance from Platteville. The Wisconsin River is the largest stream in the State and empties into the Mississippi south of Prairie du Chien.

Tremaine and Blossom Elected to Grant-Lees

CLEVELAND, Oct. 16—The Grant-Lees Co., manufacturing motor car and truck transmissions, has elected Henry A. Tremaine president and director and Carl W. Blossom, director.

Tremaine succeeds Richard Ferguson. He is vice-president of the Crouse-Tremaine-Kulas Co., treasurer of the Standard Equipment Co., and a director in several local companies, the Peerless Truck & Motor Co. being among them. Blossom succeeds F. E. Simmons, who has resigned. He is president of the Automobile Screw Products Co.

The corporation is capitalized with 80,000 shares of no par value common stock and has outstanding $142,500 of an authorized issue of $150,000 first preferred stock and $800,000 of an authorized second preferred stock.

PACKARD ANNIVERSARY

DETROIT, Oct. 16—The Packard Motor Car Co. is preparing to celebrate the 23d anniversary of the production of its first automobile. The first Packard was completed at Warren, Ohio, by J. W. Packard, Nov. 6, 1899. It had a one cylinder motor with a belt drive and three speeds forward and reverse through sliding the belt. The Packard factory was moved to Detroit from Warren in the fall of 1903.

OUTPUT CURTAILMENT STORY HAS NO OWNER

WASHINGTON, Oct. 16—Reports, as printed in several New York newspapers this morning, that the National American Automotive Association last night "at their annual banquet at the New Willard Hotel adopted a resolution favoring the curtailment of the automobile production," were to-day reported as being untrue.

Managers of the Washington bureau of the newspapers denied that such a story had been filed by their bureau. Officials of the hotel denied that such an organization had ever held a banquet there, and local automobile officials deny knowledge of any such organization as the National American Automotive Association.

The story as carried by the two New York dailies stated that representatives of certain automobile manufacturers were present and voted the curtailment. Local representatives of these companies deny any knowledge of either the organization or any action such as reported.

Dr. Stratton Leaves Government Service

WASHINGTON, Oct. 14—Secretary of Commerce Hoover has accepted the resignation of Dr. S. W. Stratton as director of the Bureau of Standards. Dr. Stratton has been elected president of the Massachusetts Institute of Technology.

Dr. Stratton has repeatedly declined attractive offers from the automobile industry. In retiring from the government service he stated that this step was necessary because of the small salary attached to the position. It is known that Secretary Hoover has paid the many experts employed in his department from his personal funds, in order that the Government might retain their services.

LAUSON ADDS NIGHT SHIFT

MILWAUKEE, Oct. 16—The John Lauson Manufacturing Co. of New Holstein, Wis., manufacturer of the Lauson tractor, farm gas engines, etc., has added a night shift in order to meet its delivery specifications, particularly on small gas engines. Tractor trade, likewise, is showing a healthy increase. The Lauson plant has been operating a full day shift since last spring.

Parts Makers Show Improved Position

Finances of That Branch of Industry Secure—Operations at Peak Rate

MILWAUKEE, Oct. 16—Production of automotive parts and equipment is proceeding virtually at the peak rate of output reached during the summer, and there has as yet been no appreciable let-down in the volume of shipments, as delivery specifications are coming freely. As a rule, however, local parts shops have caught up on directions and are keeping about even. This is considered a very satisfactory situation.

It is regarded as significant that as the result of operations in the past eight or ten months, the financial position of automotive parts industries here is gratifyingly secure. This is reflected by the fact that one large interest which among many others issued preferred stock shares during the time of financial pressure to gain more adequate working capital and general funds is now taking advantage of its option to call in these shares for payment. While the wisdom of calling in securities bearing high rates of interest at a time when ruling interest rates show a decided decline dictates this procedure to some extent, it is the fact that these industries find themselves able to repay much sooner than expected, which is significant. It is indicative of greatly improved earnings, gross and net, and represents a situation that even the more optimistic financial interests did not look to come into existence probably for another year or two.

Best of all, perhaps, is the fact that in calling in the so-called emergency securities for payment, the industries do not find it necessary to refund these debts, which is so often the case at times when it is possible to take advantage of lower interest rates by calling in high-rate paper and funding it with low-rate securities.

Farm Demand Sustained

Manufacturers of passenger cars in this territory are able, to state it broadly, to sell all they can make. The improved demand for passenger cars from the rural districts and the farms is well sustained, and is becoming more and more noticeable with respect to the medium-priced cars. Accessories are also enjoying a good demand.

Commercial car business is making slow but substantial progress, with passenger-carrying vehicle demand growing steadily and a better call for freight trucks discernible right along. Power farm operating equipment is reported to be moving better than at any time since the spring of 1920. Tractor trade, while it has not taken any decided spurt, is active once more, and predictions are freely made that 1923 will at least equal if not exceed the best year this class of machine has ever enjoyed.

Conditions in South Take on Better Tone

Crops Yielded Well and Bring Good Prices—Farmers Liquidating Debts

ATLANTA, Oct. 18—The monthly business report of the Federal Reserve Bank of Atlanta, just issued, shows general business and industrial conditions as a whole in the Southeast to have improved considerably during August and September, in spite of the railroad strike. With the strike settled, the outlook promises unusual activity during the next several months.

Automobile sales during September succeeded in holding their own, though no improvement was noted over August. Automobile and accessory business as a whole, however, was much better than the same period in 1921, with higher priced cars in much greater demand.

Financially, the district is in excellent shape, better than in two or three years. The buying power of the southeastern farmers is at least 100 per cent greater than last year. All crops yielded well and are bringing very good prices. A cotton crop in excess of 10,000,000 bales appears certain, and selling at the highest prices in some years will bring southern farmers millions of dollars in profits.

Tractor and implement sales during September were considerably better than in August and are still better the early part of October. As a whole tractor sales are more than twice as great as in the same period in 1921, and in some districts three times as great. The outlook portends normal tractor sales between now and next spring.

Better business is resulting in the organization in all southeastern States of several new automobile companies, and more construction of automobile buildings than at any time since the period of deflation immediately following the war.

Liquidating Debts

BIRMINGHAM, Oct. 18—Conditions in the South and particularly in Alabama point to a good sales season for all medium priced cars during the fall months. Another indication of good fall business is contained in the increasing popularity of the closed cars in this section. Many agents report that their sales of this type have increased 100 per cent during the past year.

In Alabama figures made public during the past few days indicate that ten of the farmers' crops will produce revenue to the farmers in excess of $52,000,000 more than the same crops produced last year. This is considered the prime reason why the farmers are taking up their old notes, some of which are three years past due, and looking around for ways and means of investing their surplus funds.

The entire back indebtedness, of course, will not be absorbed this year, but it is thought that a great many farmers who have been in debt will emerge from that condition with considerable excess funds. All of them will be good prospects for automobiles during the fall, as in Alabama the only closed season is when the roads get too muddy, and that happens in the summer months as often as during the winter.

Good Market in Chattanooga

CHATTANOOGA, Oct. 18—The bankers of this city recently made the statement that the indicated development in the entire South was far in excess of anything known in the past and gave a review of conditions to support this claim. They sought to prove that Chattanooga was the center of the proposed developments and was the best potential market in the South.

In their review they pointed to the steadily increasing production of textiles in the South, which they accredited to the abundance of cheap power, climatic conditions and efficient labor.

Included in their statement was the fact that $185,000,000 of bonds have been sold in the sixteen southern States during the first six months of 1922. This amount may be divided into $71,000,000 for roads, $59,000,000 for miscellaneous issues, $34,000,000 for schools, and $20,500,000 for sewers and drainage. The large increase in building also was cited as indicative of the better conditions now prevailing.

CARRIAGE BUILDERS RETAIN ASSOCIATION

NEW YORK, Oct. 14—At the meeting of the Carriage Builders Association in this city, the question of consolidating with the Automobile Body Builders Association was discussed at length, but was dismissed without being put to a vote.

It was felt that each organization served a distinct purpose and that they would not be benefited by a merging of interests.

W. C. Durant and J. D. Dort are still members of the Carriage Builders Association which dates back to early days.

E. E. Hughes was elected president, and G. W. Huston is secretary.

RUBBER PRODUCTS ELECTION

AKRON, Oct. 18—C. C. Schultz has been elected president of the Rubber Products Co. of Barberton, succeeding W. A. Johnson, one of the original officers of the company. Other new officers elected include J. J. Johnston, vice-president; J. M. Wiley, treasurer; John B. Chisnell, secretary and assistant treasurer. New directors elected are F. M. Hickman of Barberton, J. E. Finefrock of Canal Fulton and F. L. Graham of New York.

Survey Will Be Made of Foreign Markets

Government to Act in Co-operation with Three Automotive Associations

WASHINGTON, Oct. 17—A world wide survey of foreign markets for American made automobiles, trucks and accessories will be made by the automotive division of the Department of Commerce co-operating directly with the Motor and Accessory Manufacturers Association, the Automotive Equipment Association and the Association of Automotive Equipment Manufacturers.

Necessary plans for the survey have already been worked out with the first two named associations, and government officials will meet with members of the Automotive Equipment Manufacturers Association in Chicago on Nov. 3 to set forth their plans.

Questionnaire to Be Issued

In a word the plan is to find out from the industry, what information it desires in foreign fields in order that it may carry on a larger volume of export business. This will be put into a questionnaire and sent to commercial attaches in every country. The reports of these attaches will be transmitted to the industry through the trade press and to the associations' members by bulletin.

In addition to disseminating this information in this way, it is planned to summarize the conclusions and recommendations in order that any concern engaged in the automobile or accessory business may readily refer to these data and at a glance see whether or not there is any current demand, or likely demand in the near future, for its product in any given country, and, if so, in what part of that country.

To Give Dealers' Addresses

One of the chief problems, it is recognized, is the establishing of a contact or dealer's facilities in foreign countries. Where possible the survey will give the names and addresses of reliable dealers with whom American exporters may negotiate for foreign representation. Other necessary data, such as service facilities, advertising in that particular country, duties, tariff, and merchandising problems will be contained in the survey.

"This survey will be the most complete of its kind ever undertaken," stated Gordon Lee, chief of the automotive division. "The function of the Automotive Division of the Department is to promote foreign trade for the automobile manufacturer and allied interests. We have now come to the point where we can translate general educational work and co-operation into actual dollars and cents resulting in increased prestige for the American automobile industry the world over."

Men of the Industry and What They Are Doing

Sweet Heads Klaxon

Alfred P. Sloan, Jr., vice-president in charge of operations of the General Motors Corp., announces the appointment of William M. Sweet as general manager of the Klaxon Co., with headquarters at Bloomfield, N. J. Sweet, who has been a director and vice-president of the Klaxon company for several years, relinquished his other duties with General Motors last October to devote his entire attention to Klaxon interests. He was for years general manager of the Motor and Accessory Manufacturers Association, going from there to United Motors, where he filled a high executive office. When United Motors was taken over by General Motors he went with it as assistant to the then president of the accessory division of the G. M. C., A. P. Sloan, Jr.

I. M. Lewis Resigns

I. M. Lewis has resigned from the Bessemer Motor Truck Co., effective Nov. 1. Lewis has been president and general manager of the company since its organization 14 years ago. His plans for the future are indefinite at present, but he expects to continue in the motor truck business.

Britishers Visit Plants

Representatives of British financial interests headed by Sir Harry MacGowan closed a tour of inspection of General Motors plants in the Detroit district Friday and left for Montreal. With Sir Harry were Sir Ralph Anstruther, Donald Hope and George Watson. The party was accompanied on its tour by General Motors executives headed by President Pierre S. duPont, vice-presidents A. P. Sloan, Jr., and J. J. Raskob, and was entertained in the several cities in which are located units of the corporation by officers of the unit companies.

Fiat Executives Expected

Guido Fornaco, vice-president of Fiat Co. of Turin, Italy, and M. Gobbato, works manager, are on the Aquitania, which arrives in New York the latter part of the week. This is their first visit to America, and their plans call for a stay of about a month, in which time they will visit the leading automotive plants, accompanied by Harry T. Clinton, Fiat's American representative.

Hugh M. Craig on Vacation

Hugh M. Craig, sales manager of the Samson Tractor Co. at Janesville, Wis., since the General Motors Corp. established this plant at that point, has left for a two months' vacation with his family in Florida. It is stated that at the end of his vacation he will re-enter the service of General Motors, but with another division and with headquarters elsewhere than Janesville. Craig was connected for 18 years with the Janesville Machine Co., maker of farm implements, which was acquired by General Motors in 1918 as the nucleus of the Samson industry. Much of the Samson capacity is being converted to the use of the Chevrolet and Fisher body divisions of General Motors at this time.

To Attend Association Meeting

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, and M. L. Heminway, general manager of the Motor and Accessory Manufacturers Association, will attend the annual meeting of the American Trade Association Executives at Buckhill Falls, Pa., Oct. 25-27.

Carl G. Fisher Sells Home

Carl G. Fisher, founder of Prest-o-Lite and closely identified with the Indianapolis motor speedway, has sold his country home in that city. While he has not discussed his plans for a future home it is known that in recent years he has spent many months each year at Miami, Fla., where he has a residence and a number of interests.

New Duties for Connolly

Edward J. Connolly has been appointed production manager in charge of the body divisions of the C. R. Wilson Body Co. He has been chief engineer of the factory for the past two years and will continue this work. As production manager he will have entire charge of inspection.

United Motors Names Beardsley

Volney S. Beardsley has been appointed eastern district sales manager of the United Motors Products Co. of Grand Rapids, Mich., which is actively in production now of its new one-ton speed model, the Highway Special. Beardsley's headquarters are in Los Angeles. Appointments will be made immediately of dealers in coast cities not already closed, as Beardsley will act only as the factory representative, controlling no retail outlets himself.

Dort Adds to Staff

Sam C. Mitchell, formerly branch manager of the Cleveland Tractor Co. at St. Louis, has joined the Dort Motor Car Co. as assistant sales manager. Another addition to the Dort sales personnel is William Hufstader, former manager of the convention bureau and the publicity manager of the Flint Chamber of Commerce. W. Harold Kingsley, a newspaper man of long experience, has taken charge of the Dort publicity department. Kingsley returned last month from Paris, where he was on the European staff of the *Chicago Tribune*.

Behringer and Goodall Promoted

A. C. Behringer has been appointed assistant sales manager and Arthur S. Goodall advertising manager of the Dorris Motor Car Co., St. Louis. Behringer has been with the Dorris organization for more than two years as traffic manager. Goodall, formerly advertising manager of the Streckfus Steamboat Line, has been associated with the Dorris company for a year and a half in an advertising and sales capacity.

Tool Company Engages Maisel

Lorenz Maisel has been engaged as general works manager for the Allan-Diffenbaugh Tool & Wrench Co., Baraboo, Wis., which has completed plans for a material enlargement of its output to meet the increasing demands of the jobbing trade. Maisel was formerly designing engineer of the Burgess Battery Co. at Madison, Wis., later organizing the Madison Tool & Stamping Co., his interest in which he sold recently to make the present connection.

Reed with Spring Company

Robert W. Reed has resigned as vice-president and sales manager of the Lakeside Bridge & Steel Co., Milwaukee, to become a stockholder and vice-president of the Babcock Automobile Spring Co., manufacturing and jobbing vehicle springs, and conducting the pioneer spring service station in Milwaukee, established in 1913.

Sohn Opens Advertising Agency

Monte W. Sohn, a former editor of *Motor Life*, has organized an agency to specialize on automotive advertising, with offices at 25 West 45th Street, New York City.

Bray Joins Autocar

J. B. Bray, who has been service manager of the Grant Motor Car Corp. for a number of years, has resigned and will join the sales force of the Cleveland branch of the Autocar Co.

Cushing Makes Change

George W. Cushing, formerly advertising manager of the Hudson Motor Car Co., has resigned from the Buffalo office of Barton, Durstine & Osborne, to join the merchandising and advertising staff of C. C. Winningham, Detroit.

Distributor Appoints Leach

W. H. Leach of the Buick sales department has resigned his factory position to accept the position of assistant sales manager of the Pence Automobile Co., Buick distributor for Minneapolis and the Northwest. He will assume his new duties at once.

PERSONAL NOTES

William T. Bush Resigns

William T. Bush, for several years a sales executive of Studebaker and Packard factories and more recently director of sales of the Gray-Dort factory, Canada, has resigned from the latter position, and has returned to Detroit to reside. He has not announced his future plans.

Frick Made Chief Engineer

The Precision & Thread Grinder Manufacturing Co., Philadelphia, which was recently acquired by A. T. Doud, president of the company, has appointed William H. Frick as chief engineer in charge of engineering, development and service departments. Frick was equipment engineer for the Budd Wheel Co. He was associated with Doud at both the Diehl Manufacturing Co. and the Hero Manufacturing Co. D. F. Bruce has been appointed superintendent in charge of manufacturing and production. Bruce has had extensive mechanical experience with such concerns as W. F. Sellers, Remington Arms Co., J. E. Lonergan Co. and was formerly superintendent of the McCambridge Co.

Booth Appointed Sales Head

F. E. Booth has been named sales manager of the motor bearings division of the Hyatt Roller Bearing Co., following an extensive period of service with the company in the engineering and sales departments. Latterly he has been assistant sales manager.

Pickens Tuscora Sales Head

B. F. Pickens, formerly connected with the Amazon Rubber Co., has been appointed sales manager of the Tuscora Rubber Co. of Dover, Ohio.

McDonough Joins Overland

C. G. McDonough, formerly of the Templar Motors Co., in charge of eastern sales, and previous to that with the Clydesdale Motor Truck Co. as district sales manager, is now with the Willys-Overland Co., in charge of the taxicab and commercial car sales.

Horn Represents Bear Tractors

Richard Horn has resigned as district sales representative at Portland for the Cleveland Tractor Co. to represent Bear Tractors, Inc., as district sales manager on the Pacific Coast.

Packard Honors Harrington

Packard executives and department heads held a dinner at the Waldorf-Astoria, New York City, Oct. 13, to celebrate the twentieth anniversary of A. C. Harrington's connection with the Packard Motor Car Co. Harrington joined Packard in 1902, when the factory was at Warren, Ohio, and now is vice-president of the New York company.

N. A. D. A. ASSISTS IN TAX REPEAL MOVE

ST. LOUIS, Oct. 16—The National Automobile Dealers Association has joined with the National Automobile Chamber of Commerce in an effort to have the discriminatory war excise taxes of 1918 and 1921 repealed.

The N. A. D. A. has issued a letter to all its members urging that they give their united support to the Association's efforts and take a definite stand with the next Congress.

The letter asks that each dealer write to his congressman, senator and congressional candidates urging that the discriminatory taxes be removed. Copies of all letters and replies are asked for by the association, and from information gathered from these sources a campaign of action will be mapped out.

Business on Cash Basis Urged on Tire Dealers

CHICAGO, Oct. 17—Better times ahead for tire manufacturers in the midwestern group were predicted by W. W. Wuchter, president of the Midwest Rubber Manufacturers' Association, at the association's monthly meeting here. He declared that within six months companies able to continue operation will see improved conditions under which they will be able to make money.

The association voted to hold its November meeting at St. Louis, the place to be announced later.

Manufacturers were urged to advise their dealers to operate on a cash basis only, by Dr. R. P. Shepard, economist, representing the Chicago Association of Commerce. "The retailer who extends credit to his customers ceases to be a merchant and becomes a banker," he said. "It is not fair for the customers to ask the retailer to loan them a part of his capital. They should borrow the money at the bank and pay cash for their purchases." He advised the use of the trade acceptance.

Locomobile Creditors Approve Sale Proposal

BRIDGEPORT, CONN., Oct. 17—At a hearing before Referee John Keogh, creditors of the Locomobile Co. of America gave unanimous consent to the receiver's proposal to sell the plant and assets of the company at a private sale. Approval of the court is now the only step necessary to wind up the company's affairs.

Elmer Havens, the receiver, has indicated that W. C. Durant's offer of $1,750,000 would be accepted.

Interurbans May Be Kept Out of Detroit

If Plans Carry, Traffic Problems for Factories Will Be Increased

DETROIT, Oct. 17—Traffic problems in a number of factories here will be greatly accentuated if the plan of the Detroit Street Railway Commission to bar interurban cars from city streets is carried through. By using the interurban freight service, factories have been able to ship material from branch factories in the district and from Northern Ohio on overnight schedule. By railroad the same deliveries would take three to four days.

The railway freight service has also been used to a large extent by factory service departments in making deliveries throughout the area covered by interurban trolley service.

Would Need Fleets of Trucks

Elimination of the railway service will result in a boost for the truck business, but manufacturers who have been served by the trolleys are loath to give them up. Whole fleets of trucks would have to be bought to replace the cars, and the possibilities of trucks equalling the service are not regarded favorably.

In ruling the interurban cars from Detroit-owned lines, the city commission has taken the position that the heavier type car used in interurban service is too heavy for the city rails. The wheels designed for open rail travel are also declared destructive to the type of rail necessary in the city. Furthermore, it has been declared that much of the freight brought over the Detroit rails is shipped from out of the city to destinations outside the city, such as Toledo to Flint, and that city taxpayers should not support such service.

Chevrolet Takes Over G. M. Parts Companies

DETROIT, Oct. 17—The Central Products Co. and the Central Gear Co. of the inter-company parts group of General Motors Corp. have been taken over by the Chevrolet Motor Co. and will be operated as units of that company, manufacturing parts.

This marks a further step in the consolidation and unification of the many divisions and subsidiaries of General Motors, the subsidiaries having been reduced in number from 78 to 67 in the past year.

NEW WHITE BRANCH PLANT

NASHVILLE, TENN., Oct. 16—Howard C. Goss, manager of the White Motor Co. branch here, advises that the White company is planning the establishment shortly at Chattanooga, Tenn., of a branch plant for the manufacture of trucks.

Hispano Producing New 4-Cylinder Car

Speed Is 90 Kilometers Per Hour —Fiat Builds Own Bodies in Spain

WASHINGTON, Oct. 17 — Entirely equipped with American machinery and normally employing about 1000 men, the Hispano automobile factory at Guadalajara, Spain, subsidiary of the Hispano-Suiza Co., Barcelona, is manufacturing a new Hispano four-cylinder eight-horsepower passenger car, the real horsepower of which is estimated to be 20-30, according to a report made to the Department of Commerce by Commercial Attaché Charles H. Cunningham, Madrid.

This car has a maximum speed of 90 kilometers per hour and sells for about 16,000 pesetas. The factory has orders for 100 of these new cars. American electrical equipment undoubtedly will be used in them as in the past. Wages paid at the factory range from 7 to 9 pesetas a day, about 20 per cent less than those paid in Barcelona, where the unions are extremely strong.

The Fiat body plant at Alcala de Hernares is constructing bodies for most of the Fiat cars imported into Spain. The lumber used is entirely Spanish, and oak logs are brought into the factory and converted into lumber, dressed, planed and utilized for bodies in the same plant.

Considerable American machinery, such as lathes, radial drills and serpentine shears, is being used in this plant, and the factory is now considering the purchase of an American paint spray, as the advantage of painting a car by use of two men and a machine, as against 10 men by hand, is appealing to the Spanish manufacturer.

New Studebaker Sedan Has Added Equipment

SOUTH BEND, Oct. 17—Priced somewhat higher than the regular sedan mounted on this chassis, the Big-Six sedan (special) embraces many items of equipment not included on the regular model.

Included in the additions are nickel plated bumpers in front and rear, trunk with dust proof cover, two extra disk wheels complete with tires mounted on the front fenders, automatic windshield cleaner, Moto-Meter, ornamental radiator cap and rear view mirror. The radiator shell is nickel plated. Other features are the courtesy light, cowl ventilator and heater. The upholstery is mohair velvet plush with top lining and carpets to match.

CHANGE IN PACKARD

DETROIT, Oct. 16—A change recently made in the Packard single six coupe permits the carrying of a golf bag and sticks without projecting out from the luggage compartment or interfering with passengers. An opening has been cut through to the compartment under the driver's seat. The golf bag slips into this space and extends back into the rear luggage compartment. Cars with this change incorporated are promised for the latter part of October.

MEXICO PUTS DUTY ON IMPORTED CARS

MEXICO CITY, Oct. 16—The "Diario Official" has published a presidential decree to the effect that automobiles, which were previously exempt from import duties, will be subject to a 10 per cent ad valorem import tax.

Former President Carranza decreed the exemption of duties on automobiles in the belief that it would be of benefit to farmers and general business.

Hupp Now Turning Out Special Phaeton Model

DETROIT, Oct. 14—Hupp Motor Car Co. is now in production of a special phaeton model which will embody sport line features and sell at $1,250, f.o.b. Detroit. A roadster of similar type will be started in production in the near future. The car has nickled radiator, rails, lights, etc., aluminum steps, disk wheels and a genuine Burbank top. There is no change in chassis construction.

Australia to Assemble New "Eco" Next Month

WASHINGTON, Oct. 17—Australia's first automobile manufacturing company will begin operation on Nov. 1, with the production of an assembled car, composed of parts purchased, for the major part, in the United States.

The new car is to be known as the "Eco" and while "manufactured" in Melbourne, Australia, it will be almost entirely an American car, with the exception of the car body. The car will be produced by the G. Hamilton Grape Manufacturing Co. It is understood that Australia's first car will be along the lines of the most popular make of American low priced machine.

The company has established a purchasing agency in Detroit where, it is expected, the major portion of parts will be purchased.

ACCESSORY EXHIBITS

NEW YORK, Oct. 18—M. L. Heminway, general manager of the Motor and Accessory Manufacturers Association, announces that 125 members will exhibit in the national shows at New York and Chicago. Of these 82 will exhibit in both shows, 34 in New York only and nine in Chicago only.

Norma Has Hoffmann Rights in America

Company Will Erect Plant for Manufacture of Products of British Maker

NEW YORK, Oct. 18—The Norma Co. of America, of Long Island, has acquired the American patents and business of the Hoffmann Manufacturing Co. of Chelmsford, Essex, England, maker of Hoffmann roller, ball and thrust bearings. The line of Norma Precision ball bearings now will be supplemented by Hoffmann Precision roller bearings and other bearing products in the Hoffmann line, which have enjoyed abroad the same repute which high-precision standards have given the Norma bearing in America.

The Norma company will erect a new plant for the manufacture of Hoffmann products in America. Meantime, they are being imported and sold under the regular Norma engineering service.

Flat Tread Truck Tire Is Announced by India

AKRON, OHIO, Oct. 16 — A new double oversize extra-ply flat tread cord truck tire is announced by the India Tire & Rubber Co. The tread has been designed for conformity to road surfaces. The broad, flat face which comes in contact with the road, wears very slowly and evenly, and gives greater traction and non-skid qualities. Heavy ribs on both sides of the tread afford additional protection against rut and curbstone wear.

The tread stock has been brought well down over the sidewalls, giving added strength to the carcass. The bead has been extra-heavily re-inforced. A special cushion and breaker strip construction is incorporated which distributes road shocks to all parts of the tire, rather than allowing the shocks to be absorbed by just those portions which are struck.

"Royal Coach" Becomes Part of Lexington Line

CONNERSVILLE, IND., Oct. 18—An addition to the Lexington line is the Royal Coach listed at $2,145. It is a five-passenger body with ample room for three on the rear seat and with two individual Pullman type chairs in front. The body is of the two-door type, the vision being extremely wide by reason of the large glass area and the design of the slanting windshield with its glassed triangle.

PIERCE-ARROW BUSINESS

BUFFALO, Oct. 17 — Pierce-Arrow Motor Car Co. reports sales for September greater than for any September since 1915 and 150 per cent ahead of a year ago. September orders showed an increase of 10 per cent over August, the biggest month in the company's history.

Hardware Men Meet Accessory Makers

Greater Interest in Automotive Equipment Shown at Atlantic City Convention

ATLANTIC CITY, Oct. 20.—Approximately 50 manufacturers of automotive equipment staged exhibits in a hotel here during the conventions of the National Hardware Association and the Automobile Accessories Branch of that association, held throughout the week. The equipment manufacturers also took part in the discussions of the automobile accessories branch, making suggestions to the hardware jobbers for development of their own and their dealers' business in automotive products.

The discussions, participated in by hardware jobbers as well as automotive equipment manufacturers, indicated a growing interest on the part of the hardware trade in the profit making possibilities of automotive equipment. The hardware men generally claimed that hardware retailers were better merchants and better credit risks than the average automotive man but they admitted offsetting faults of the hardware trade, such as lack of mechanical automotive knowledge, failure to carry complete automotive equipment lines and lack of natural contact with automotive equipment purchasers, such as automobile dealers and garagemen have.

Representatives of the National Retail Hardware Association spoke, attributing sluggishness in the development of automotive equipment retailing in the hardware field to some extent to failure of hardware jobbers salesmen properly to sell it. They criticised hardware jobbers' travelers for lack of knowledge of the use and methods of retailing automobile products.

There were several attempts to estimate the volume of automotive equipment business done by the hardware trade. One jobber said that less than 10 per cent of his dealers handled accessories, while several others placed the figure considerably higher, though stating that the bulk of their wholesale sales of equipment were to automobile dealers and garagemen.

2,000,000 Output Year Now Assured for 1922

(*Continued from page* 986)

on its pre-show season when scattered closed car exhibits are having a stimulating effect on sales.

The problem confronting the industry in Detroit of securing its steel supply, due to the diversion of rail equipment for the shipment of coal, particularly to lake ports, and the transportation of farm produce, will probably be solved by the employment of motor trucks between Pittsburgh, the principal source of supply, and that city. This condition is expected to continue until the closing of lake navigation. The success of the plan will remove one of the chief obstacles in the way of sustaining production at a high figure. Materials are reaching Detroit with only slight interruption, not great enough to prove a serious deterrent.

Light duty trucks continue to gain in demand, due directly to the coal situation and the apportioning of supplies to householders in small quantities. These vehicles are showing a stronger growth than is noticeable in the heavier trucks, which, however, are more than holding their own.

TABLE SHOWING RANGE OF FORD PRICES

DETROIT, Oct. 17—The following table shows the range in Ford prices from Aug. 1, 1916, to the present time, when a reduction of $50 brings the models down to the lowest price level in the history of the company:

MODEL	Aug. 1, 1916	Aug. 1, 1917	Sept. 21, 1917	Oct. 16, 1917	Feb. 25, 1918	Aug. 16, 1918	Mar. 9, 1920	Jan. 1, 1921	June 1, 1921	Sept. 1, 1921	Jan. 1, 1922	Oct. 17, 1922
2-pass.	$345	$345	$350	$350	$435	$500	$550	$395	$370	$325	$319	$269
5-pass.	360	360	365	365	450	525	575	440	415	355	348	298
Coupe	...	...	...	...	...	...	*850	745	695	595	580	530
Sedan	640	645	650	695	695	775	*975	795	760	660	645	595

*Includes starter and demountable rims.

Toland Heads Thomart Distribution in East

NEWARK, N. J., Oct. 18—Distribution of the Thomart speed truck for the entire eastern portion of the United States has been taken over by Eastern Thomart, Inc., this city.

The new company is headed by William G. Toland, former vice-president of sales for Hare's Motors. Toland has taken with him several of his former Hare's Motors and Packard associates; W. S. Hill, vice-president, was formerly special representative for the Hare organization. William J. Foster, secretary and treasurer, was transportation engineer for both Hare's Motors and the Packard Motor Car Co. of New York. William Carl Chapman, advertising and sales production manager, was former advertising manager for Hare's Motors and previous to that was advertising manager for the Packard Motor Export Corp.

HUPP COMPLETES SCHEDULE

DETROIT, Oct. 17—The Hupp Motor Car Co. completed its schedule of 30,000 for 1922 Tuesday and reports that business will continue on a firm footing. President C. B. Hastings said there were no indications of a severe falling off in business at this time and expressed the belief that it would continue steady through the winter. Increased factory space will permit considerable expansion in 1923, he said. Hastings denied that the Hupp Motor Car Co. was considering the taking over of another car manufacturing company.

Ford Lowers Prices; Phaeton Is Now $298

(*Continued from page* 787)

Ford reduction has been expected in manufacturing circles for some time. Both Chevrolet and Overland in the low priced groups have recently made reductions, and the Ford reduction completes the revisions in the former low priced group. The recent Ford financial statement and declaration of price policy by Henry Ford indicated reductions would be forthcoming.

Ford Prices Cut in Canada

DETROIT, Oct. 18.—Ford Motor Co. of Canada, Ltd., followed the price cut of the United States company with a reduction ranging from $50 to $85 on all models. The phaeton is $445, roadster $405, coupe $695, and sedan $785. There is a price differential of $85 for self-starter and demountable rim equipment. The truck is $495 and chassis $345. The new prices are the lowest ever quoted on the Canadian car.

Orders covering several months operation were on hand when the new prices were put into effect, according to Ford officials. Production has been running in excess of 5000 cars daily but this was several hundred daily under retail sales at the former price. With the increased demand expected as a result of the reductions, the company will build production up to 6000 daily.

No Durant Comment

NEW YORK, Oct. 17—Will Star meet the Ford prices? was the question asked to-day when the new list of the Detroit manufacturer was announced. However, executives of Star Motors, Inc., refused to comment on the reduction.

MOON MODEL LOWERED

ST. LOUIS, Oct. 17—A reduction of $100 on the six-40 phaeton is announced by the Moon Motor Car Co., effective to-day. The drop was from $1,295 to $1,195. This model is the only one of the line affected.

CLEVELAND PHAETON REDUCED

CLEVELAND, Oct. 19—The Cleveland phaeton has been reduced from $1,095 to $995, and the four-door sedan from $1,585 to $1,495.

67 Cu. In. Salmson Sets World's Record

Four-Cylinder Water-Cooled Car Maintains Average Speed of 94 M.P.H.

PARIS, Sept. 28 (*by mail*)—An average speed of 94.9 m.p.h. for the flying kilometer is the world's record for 67 cubic inch cars established by Lombard in a four cylinder water-cooled Salmson. This performance was made in the Bois de Boulogne, Paris, and was electrically timed by the Automobile Club of France.

In accordance with international rules, the run was made in two directions and the average taken. On the outward run the single-seater Salmson covered the flying kilometer in 23 80/100 sec.; the return run was made in 23 35/100, giving an average for the kilometer of 23 57/100 sec. By this performance Lombard broke his own record of 80.93 miles an hour, set up a few weeks ago on Brooklands track, England.

A two-seater Salmson of the same piston displacement, driven by Benoist, averaged 82.82 miles an hour for the flying kilometer.

A 45-inch Senechal, driven by its maker, broke the world's record for this class by averaging 71.23 miles an hour as a two-seater and 72.14 miles as a single seater. This machine was fitted with a four cylinder overhead valve Ruby engine.

Pullin, riding a 750 cc. twin cylinder Douglas motorcycle averaged 97.76 miles an hour over the flying kilometer, thus establishing a world's record.

VELIE BUSY ALL WINTER

MOLINE, ILL., Oct. 17—Closed car business will keep Velie Motors Corp. in operation throughout the fall and winter, according to predictions by company officials. A force of approximately 600 men is employed and will probably be maintained. Twenty-five cars a day are now being completed and will be continued as long as prospects continue.

STATE RECOGNITION GIVEN MOTOR VEHICLE

ALBANY, N. Y., Oct. 16—The motor vehicle as a common carrier is recognized in an opinion handed down by Charles G. Blakeslee of the Public Service Commission, who passed on the application for the operation of a bus line between Norwich and Syracuse. Blakeslee favors the granting of the application and asserts that the motor vehicle as a common carrier is here to stay.

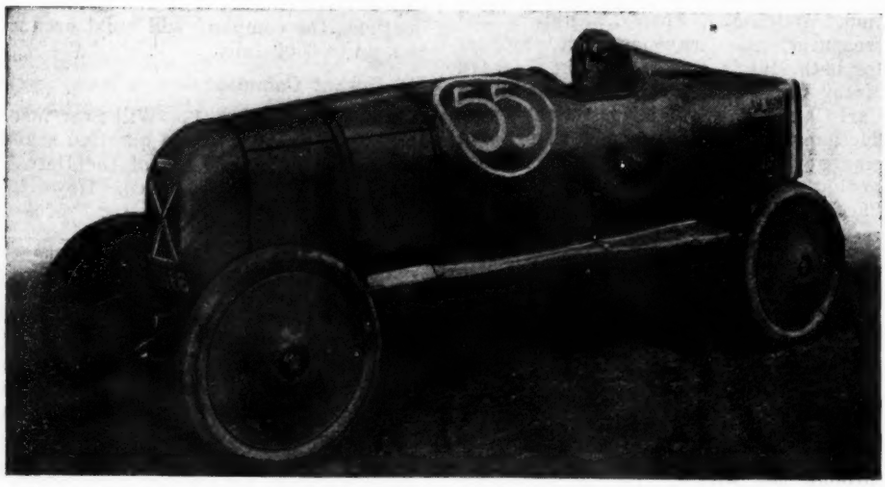
Trexler Co. Takes Over Factory in Wilmington

WILMINGTON, DEL., Oct. 16—The Trexler Co. of America, manufacturer of automobile accessories, with offices in Philadelphia, has taken over the local plant of the Artillery Fuse & Standard Arms Co., for manufacturing purposes.

The local plant, which covers 27 acres, and is located in South Wilmington, on the outskirts of the city proper, was used during the war for the manufacture of fuses and various other devices in connection with artillery equipment. It is fitted with much intricate machinery and has been idle for some time. It has an assessed valuation of $900,000.

M. J. Adair of Philadelphia is president and E. J. Flannery of the same city, vice-president of the Trexler Co. George A. Huhn & Sons of New York, Philadelphia and Chicago are underwriters of the securities.

Holder of World's Record for 67 cu. in. Cars



This four-cylinder water-cooled Salmson maintained an average speed of 94.9 m.p.h. over a course in the Bois de Boulogne. Following international rules, the run was made in two directions and the average taken. The previous high record, 80.93 m.p.h., was made in England a few weeks before by the same driver, Lombard

Government Makes Snow Removal Plans

Cannot Aid Financially But Will Offer Road Equipment Free to States

WASHINGTON, Oct. 18 — Winter travel by automobile in the central and northern states, heretofore hampered by snow-covered roads, will be made possible in the future, if plans of the Bureau of Public Roads of the Department of Agriculture can be consummated.

Through the co-operation of the state highway commissions the bureau hopes to utilize surplus war equipment, such as tractors and grading plows, to be employed in the removal of snow and sleet from the main arteries of the public highways, during winter, to the end that automobiles may have the use of the roads through the greater part, if not all, of the winter.

A canvass of the situation is now being made by the bureau with the state highway commissioners. Under the Federal laws none of the money appropriated by Congress for Federal-aid roads can be employed in maintenance of highways, this being solely up to the State. Once a road is built it is obligatory upon the State to keep it in repair, under a penalty of having all Federal funds withdrawn.

Co-operation Is Possible

So under the law, while it will not be possible for the Federal Government to aid financially in the snow removal program, the emergency can be met, it is believed, by the Federal Government, through the bureau of roads, donating gratis to the states the necessary equipment. It is expected that the states will furnish the labor for the operation of the equipment, and if this can be arranged with the State highway Commissions, it is certain that at least a great many of the northern states will be able to maintain automotive highway transportation service, which has heretofore suffered because of the snow-ladened roads.

The bureau of roads already has sufficient equipment of war-surplus material to supply the States for this purpose, provided the states themselves will man and operate it.

The work of making the survey is being carried on under the supervision of H. K. Bishop, chief of the division of construction of the bureau of roads.

INTERNATIONAL GAINING

AKRON, Oct. 17—The Akron plant of the International Harvester Co. has reached a production of 125 trucks a week, as compared to an output averaging only 40 trucks a week two months ago. The Akron factory now is employing between 800 and 1000 men and expects to increase truck production further.

Nation's Aviators Form Association

Howard E. Coffin Elected President at Organization Meeting in Detroit

DETROIT, Oct. 14—The National Aeronautic Association became a reality this week with the official filing of a charter under Connecticut laws and the adoption of a constitution and by-laws, by which it will function as a national organization whose primary aim is to make the United States "first in the air." The association will endeavor to promote civil and commercial aviation largely through the encouragement by the Government of private enterprise in the carrying of mails.

Coffin Well Known in Aviation

Howard E. Coffin, vice-president in charge of engineering of the Hudson Motor Car Co., was named first president of the association. Coffin is widely known for his interest in aviation and for his services to the Government during the war in the development of its air program. He acted as chairman of the executive committee of the advance committee on organization of the aeronautic bodies, and his selection as president is a special tribute to his energy and interest in the promotion of aviation.

The association plans a membership of 19,000 in its first year divided into eight classes. These are honorary, federal honorary, life, sustaining, regular, junior, organization and air board. The direction of the affairs of the organization will be vested in its officers and a board of governors numbering twenty-three, five of whom will be governors-at-large. The association will maintain a paid general manager, whose salary will be $5,000 annually, and will employ three paid field representatives whose work will be building up the membership.

Other Officers Elected

Other officers are B. M. Mulvihill, Pittsburgh, vice-president; B. F. Castle, New York, treasurer; John B. Coleman, Sioux City, Iowa, secretary. The board of governors are S. D. Walden, Detroit; P. H. Adams, Boston; G. L. Cabot, Cambridge, Mass.; John D. Larkin, Jr., Buffalo; Morris J. Cleary, New York; L. F. Sevier, Pittsburgh; R. F. Walters, Baltimore; A. S. Fliery, Birmingham; F. H. Burgin, Atlanta; Glenn L. Martin, Cleveland; D. M. Outcault, Cincinnati; C. S. Rieman, Chicago; Ralph Cram, Davenport, Iowa; Howard Wehrle, Kansas City; Edgar Tobin and William Long, San Antonio; P. G. Johnson, Seattle; C. H. Messer, Spokane.

The board will elect the governors at large and general manager.

An objection to the election of Martin as a governor on the ground that the association should not tie itself up too closely to aircraft manufacturers was overruled. There was some sentiment among delegates against the possibility of domination by manufacturers, but aside from the objection to Martin this did not materialize. The greater number of delegates were members of air clubs and ex-service men, with only a sprinkling of manufacturers or manufacturers' representatives.

Resolutions adopted favored the establishment of a Federal agency to govern aviation; requested Congress to authorize air mail contracts with private companies; urged adequate appropriations for aircraft experimentation by Federal departments; encouraged National Guard aviation units, and condemned circus stunts or freak flying stunts. A resolution congratulating the mail service on its successful air operation also was adopted. On the recommendation of Rear Admiral W. F. Fullam, chairman of the committee on policy and legislation, the convention voted against any action at this time on pending legislation affecting Federal aviation policies. A resolution creating an association trophy open to international competition was referred to the contest committee.

The locale of the next convention will go to the city awarded the 1923 Pulitzer trophy race.

Will Have Reserve Fund

The association plans to raise $57,419.38 during the coming year from memberships and other sources, which will carry it through its first year of organization and create a reserve of $37,219.37 for the inauguration of its second year's program. The Chamber of Commerce of Davenport, Iowa, was the first to file application for an organization membership. In its plan to promote commercial aviation, the association will seek to enroll trade bodies in each city in the United States in this class of membership.

AUSTRIAN AIRPLANE WING DESIGNS HERE

WASHINGTON, Oct. 17—Plans describing the invention of pneumatic, pulsating wings for airplanes, invented by an Austrian, have been received by the automotive division of the Department of Commerce from Foreign Trade Commissioner William Ford Upson at Vienna.

The invention has been commented upon by various newspapers of Europe as being "Revolutionary in airplane construction." Airplanes with fixed wings and an engine driven propeller, according to the inventor's line of research, can be shown vastly inferior in relative performance to one constructed with these wings, which are comparable to those of a soaring bird or insect.

Manufacturers of airplanes, or others interested, may secure the loan of the plans upon application to the bureau, requesting exhibit 269.

Air Records Broken by American Flyers

Aviator in Curtiss Army Biplane Averages 229 M.P.H. at Mount Clemens

MOUNT CLEMENS, MICH., Oct. 18—Flying a Curtiss army biplane powered with a Curtiss 400 hp. engine, Lieut. R. L. Maughan established an unofficial airplane speed record by covering a one-kilometer course at the rate of 248.5 miles per hour.

This record was made by the same plane that won the Pulitzer Trophy Race and was timed by officers from McCook Field during official Government tests of speed planes that participated in the National Air Races at Selfridge Field.

Lieut. Maughan proved that this tremendous speed could be maintained by continuing flying after the record was broken and doing four laps at the rate of 232.22 miles per hour and averaging 229 miles per hour for eight laps.

In the same plane to-day Brig. Gen. William Mitchell made an official one kilometer trial at Selfridge Field in which he made an average speed of 224.5 m.p.h. in four heats, which will stand as record.

Heavier-Than-Air Flight

NEW YORK, Oct. 17—All records for sustained flight in a heavier-than-air flying machine have been broken by Lieuts. John A. Macready and Oakley Kelly by a flight lasting 35 hours, 18 minutes, 30 seconds. The previous record was made by Stinson and Berthaud last December when they stayed aloft 26 hours, 19 minutes, 35 seconds.

The new record was made with an Air Service transport T-2 monoplane weighing on this flight 10,700 pounds, of which 4000 pounds consisted of gasoline and oil. Air Service officials regard the flight as a wonderful demonstration of the Liberty engine with which the plane was powered.

NEW YORK, Oct. 17—Two French airmen, Bossoutrot and Drouhin, have beaten the official world's record for sustained flight made by Stinson and Berthaud, by a flight lasting 34 hours, 14 minutes, 7 seconds.

They hoped when starting on their flight to break the uncontrolled record of Lieuts. Macready and Kelly, but were forced down within an hour of achieving this goal by a shortage of gasoline.

The flight was made over a triangular course, but the distance covered is exactly equal to the distance from Paris to New York.

FRANK H. PARKER DIES

MILWAUKEE, Oct. 18—Frank H. Parker, president of the Parker Motor Truck Co., Milwaukee, and guiding head of several other large manufacturing industries, died at Columbia Hospital after a brief illness, at the age of 66 years.

FINANCIAL NOTES

Packard Motor Car Co. reports earnings of $900,000 in September and $16,000,000 on hand in cash and marketable securities. Resumption of common stock dividends, believed immiment, has not been discussed by the directorate. Outstanding notes may be retired on April 15 next if conditions warrant. Single six inventory is being turned over every 60 days due to increased production and improved factory efficiency.

Stewart-Warner Speedometer Corp. may increase dividends to $1 a share at the meeting Oct. 20. In April, 1921, dividends were reduced from $1 to 50 cents, and increased to 75 cents in April, 1922. Net profits before taxes in the third quarter will be about $1,500,000. In the first half they were $2,121,686, with total annual dividend requirements $1,899,200 on the 474,800 shares outstanding at the rate of $4 a year.

Allis-Chalmers Manufacturing Co. for the quarter ending June 30 reports net profits of $299,796, after Federal taxes. This is equivalent to 4 cents a share on its $25,770,750 common stock, contrasted with $278,733, or $1.69 a share on the preferred stock in the preceding quarter, and $635,880 or $1.34 a share after preferred dividends in the corresponding quarter of 1921.

General Electric Co. stockholders have been notified that orders for the three months ended Sept. 30 show an increase of 42 per cent over the same period in 1921, the totals being $58,914,620 in 1922 as against $41,608,332 in 1921. For the nine months ended Sept. 30 there has been a 30 per cent increase, with $176,171,194 in 1922, as against $135,256,462 in 1921.

Seiberling Rubber Co. in a statement issued to stockholders announces that sales for the past four months have averaged in excess of $500,000 a month and that a profit on all sales has been shown. The company has taken no dividend action this year, but it is understood a dividend adjustment will come in December or soon after the first of the year.

B. F. Goodrich Co.'s consolidated balance sheet as of June 30 shows cash in banks and on hand of $5,394,581; trade accounts receivable, $17,337,015; other accounts receivable and sundry advances, $2,913,000; raw materials and supplies, $24,145,625; accounts payable, $2,161,683; sundry accrued liabilities, $1,271,981, and earned surplus, $10,203,816.

A. O. Smith Corp. announces that on Nov. 15 it will redeem out of a sinking fund of $83,346 preferred stock at not to exceed $110 a share. Holders of that issue are invited to make sealed offerings to the Columbia Trust Co. of New York on or before Oct. 23.

Hood Rubber Co. for the first half of the current fiscal year ending Sept. 30 has earned approximately $5 a share on the 110,000 shares of common after interest charges and preferred dividend requirements.

Indiana Truck Corp., Marion, Ind., has declared its regular quarterly dividend No. 23 of 1¾ per cent on the preferred stock payable Oct. 1 to stockholders of record Sept. 30.

Ford Motor Co. of Canada has declared a cash dividend of 15 per cent, payable Oct. 20 to stock of record Oct. 13.

TO SELL SEARS TIRE PLANT

DAVENPORT, IOWA, Oct. 14—District Judge A. P. Barker has entered an order directing the sale of the Sears Tire Equipment Co. plant here to satisfy a judgment of $23,710.63 awarded the Scott County Savings Bank on a promissory note. The bank sued Otis Gilbrech, trustee in bankruptcy proceedings, Ernest & Jansen and the Whiting Corp., two contractors who held claims against the plant, and all defaulted. Judgment was not contested.

"Dalco" Makers to Start Operations in New Plant

CLEVELAND, Oct. 18—The Dall Parts Co. will start production in its new factory in this city on Nov. 15, according to W. D. Smith, secretary.

The company was organized in 1916, has been situated in Vermilion, Ohio, which is west of this city. The business has grown to such an extent that larger quarters are needed to keep up with the demand. Better shipping facilities also are necessary.

The company manufactures replacement pistons, and the layout in the new factory will be complete not only for making the product, but for selling it. The foundry and machine shop will be closely connected, and the stock room has been laid out with a view to expediting the handling of orders. The transfer from Vermilion to this city will be done without interrupting the delivery of products from the company to the dealers.

BUICK EXCEEDING SEPTEMBER

DETROIT, Oct. 17—Buick sales for October will exceed the total of 16,842, set up in September, according to President H. H. Bassett. The September total, which includes the output of the Canadian plant, averaged 748 daily. The daily high production mark for the Detroit and Flint plants combined was set Oct. 12 at 775.

Sales reports from Leishman & Co., Mexican distributor for Buick, show 43 cars delivered at retail within 25 days. Business is continuing to grow, the report adds, and an increased distribution in October is looked for.

OLDS SERVICE MEETING

DETROIT, Oct. 17—Seventy service men representing the larger distributors and dealers of the Olds Motor Works attended the annual factory conference and demonstration this week. R. K. Jack, head of the engineering department, talked to the service men on engineering features, and President A. B. C. Hardy spoke on Olds organization and workmanship.

AC SPARK PLUG ABROAD

FLINT, MICH., Oct. 16—As a result of the recent visit to Europe of Albert Champion, it is announced that AC spark plugs for England and its colonies will be made in the plant of the Sphinx Manufacturing Co. of England, while the French trade will be cared for through similar negotiations made with the Oleo Co., which will manufacture the American product.

BANK CREDITS

Written exclusively for* AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.

Last week call loans ranged between 4½ per cent and 6 per cent as compared with 4 per cent and 5 per cent in the previous week. The firmer tendency noted during the first part of the week was occasioned, undoubtedly, by the calling of loans by banking institutions in anticipation of the new Government bond issue.

On Friday, after the intervening holiday, a slightly easier tone was noted. Fractional advances for fixed date maturities were noted. Sixty days' maturities were quoted at 4¾ per cent, 90 days', four, five and six months' at 4¾ per cent to 5 per cent as against 4½ per cent to 4¾ per cent for 60 and 90 days', and 4¾ per cent for four, five and six months' the week before. The prime commercial rate remained unchanged at 4¼ per cent to 4½ per cent.

As of Sept. 30 the unfilled orders on the books of the United States Steel Corp. totaled 6,692,000 tons which was an increase of 742,000 tons over the total at the end of August and is the largest gain reported for any one month since January, 1920.

The cumulative effects of the coal and railway strikes together with the 10 per cent reduction in freight rates, effective July 1, were finally shown in railway earnings for August. The Class I carriers reported net operating income at $52,580,000 which represents an annual return of only 2.65 per cent on the tentative property valuation.

With a marked gain in the loadings of merchandise and miscellaneous products, the total car loadings for the week ending Sept. 30 totaled 988,381, the largest number since the week ending Oct. 22, 1920.

Bank Circles Troubled by Price Fluctuations

DETROIT, Oct. 16—Fluctuations in automobile prices are being viewed with considerable disquiet in banking circles, according to a factory executive of one of the largest companies in Detroit, and some little difficulty may be experienced in financing dealer shipments during the fall and winter unless some sort of guarantees are given that further revisions are not contemplated. This condition applies particularly in the East, where this executive has been in touch with banking officials.

New prices and new models have practically wiped out used car valuations, he said, and many dealers are liquidating used car stocks at prices which must be made up on new car profits. Too little consideration has been given the condition of dealers' stocks in bringing out new models and cutting prices. In no case where price cuts are made, he said, should they exceed the amount of dealer discount, leaving always some margin of profit on sales.

Six States Discuss Uniform Road Laws

British Columbia Also Represented at Coast Meeting—Plans Move Forward

PORTLAND, ORE., Oct. 16—Uniformity of traffic laws for the Pacific Coast and Rocky Mountain States, together with British Columbia, appears as a possibility on the horizon as a result of a conference held here this week, in which motor vehicle administrative officials of the various states, judges and enforcing officers participated.

After two days of discussion of the various subjects relative to motor vehicle legislation and law enforcement, the session closed with the formation of an executive committee empowered to aid in drafting possible new legislation relating to traffic in the six western states and British Columbia, and to assist lawmakers of the various states in the study of the traffic problem and the passage of desirable codes.

Kozer Named Chairman

Sam A. Kozer, secretary of state for Oregon, who called the Pacific Coast traffic conference, was elected chairman of this committee, and other members are: L. D. McArdle, director of the department of efficiency of the State of Washington; Fred J. Dribble, director of licenses for Washington; Robert O. Jones, secretary of state of Idaho; H. E. Crockett, secretary of state of Utah, and Charles J. Chanu, chief of the division of motor vehicles for California.

The committee is empowered to meet at the call of the chairman or of any two members, and its first business will be to hold meetings at which a uniform law governing interstate and intra-state traffic will be worked out, to be submitted to the law governing bodies of the western states and British Columbia.

Expect National Uniformity

Desirability of uniform regulations and uniform law enforcement in the various states was expressed by several speakers at the sessions, and the belief was expressed by several that nation-wide traffic control, or at least nation-wide uniformity, will be the eventual necessity. Until that time, however, it was stressed, uniformity of laws for the Pacific Coast section will be extremely desirable. The session at this time was really the outgrowth of a meeting held two years ago in Portland, the result of which was the virtual uniformity of Oregon and Washington laws.

The session was called to order by Governor Olcott of Oregon, and among the speakers were the following: Robert O. Jones, secretary of state for Idaho; L. D. McArdle of the bureau of efficiency of Washington; Charles J. Chenu, chief of the division of motor vehicles of California; Secretary of State Kozer of Oregon, Douglas A. Shelor, manager of the automobile club of Western Washington, and a number of municipal judges and traffic enforcement officials of the various Pacific Coast cities.

INDUSTRIAL NOTES

Burdick-Atkinson Corp. has been established at Hamburg, N. Y., to manufacture steel wire springs for use in automobile coach work upholstery. John S. Burdick, formerly vice-president and general manager of the Buffalo Body Corp., is the incorporator of the company. Associated with Burdick, who is president and general manager, are Frederic R. Atkinson as vice-president and factory manager, Franklin R. Brown, treasurer and Harry Burdick, secretary.

G & J Tire Co. of Indianapolis is adding a night force of 250 men and increasing the regular force 30 per cent, according to President W. B. Harding. The normal force is about 1750 men and the production is between 30,000 and 35,000 tubes a day. The factory consumes 1,500,000 pounds of raw rubber a month and the demand for its product is rapidly increasing. Production schedules for October and November are the largest in the history of the company.

Doss Tire & Rubber Co. has added a new unit to its plant at Atlanta increasing the former capacity of the plant by approximately 50 per cent, according to C. C. Harper, president. The company further advises that due to rapid betterment in business conditions over the South of recent months its entire output is sold for several months ahead. The plant has been operating day and night during all of 1922.

Parsons Manufacturing Co., manufacturer of automobile hardware, has opened an office in Chicago in the Mallers Building in charge of C. P. Knisely and W. M. Townsend. The Chicago office will serve the territory of Wisconsin, Illinois, Indiana, St. Louis and Ohio, not including Cleveland and Toledo. Plans are under way for plant expansion in Detroit due to rapidly increasing business.

Kohler Co. of Kohler, Sheboygan County, Wis., which has been carrying forward an important plant enlargement program for more than three years, has ordered plans for another four-story building, 160 x 170 ft., costing about $350,000 complete. The company manufactures a farm lighting plant.

Firestone Tire & Rubber Co. has commenced operations at its plant at Hamilton. About 300 men are being employed at the outset. This force will be increased to 500 within a few weeks. The opening of the plant was delayed by the non-arrival of machinery expected last month.

New Addition by Holley Will Double Floor Space

DETROIT, Oct. 18—Holley Carburetor Co. will complete this month an addition to its factory here which will about double its floor space. Production in 1922 will double the output of 1919 when the present factory building was erected and will be the high production record for the company for any one year.

The new factory addition will cost $60,000. Much of the equipment which will be installed represents the special design of officials of the company.

METAL MARKETS

Diminishment of the bulge in steel prices for prompt shipment continues apace, odd distress lots of sheets being the only exception. Obviously premiums on early deliveries must disappear before any readjustment in base prices will make itself felt. The gratifying feature of the situation is that the very interests who are optimistic as to a continuance of a fair volume of business in the steel industry are firm believers in the resumption of the downward readjustment of price levels as an inevitable concomitant of a broadening in the demand. One of the causes responsible for much distorted vision in the steel market is that there are many producers and consumers who have their noses too close to the grindstone.

They follow religiously every change that takes place from day to day and as each one of these changes is naturally of a minor character they reach the erroneous conclusion that the market is of a stationary character. Slight, however, as the day-to-day changes may be, those who sound the market after an absence from it of a few weeks notice that its tone has undergone a complete change. Nominal price quotations may be unaltered and yet the keen judge of market conditions will instantly recognize an altered state of affairs. Such a change in the market's atmosphere appears to be in progress at this very moment.

Although quotations undergo but little revision from day to day and although here and there when a small tonnage of this or that steel product is urgently needed premium prices may still be paid, the market's undertone clearly reveals the gradual change from an out-and-out sellers' affair to one in which buyers' views will have more and more influence on prices. Those who follow the market from day to day would also do well to study occasionally the monthly statistical resumes of production and prices and note how frequently these are at variance with the day-to-day information that precedes it from Pittsburgh and Youngstown. A case in point was the September report of steel ingot production by the American Iron and Steel Institute the official figures in which showed conclusively that the many alarmist reports of sharp contraction in steel production during September were not well founded. The same discrepancy between daily press reports and actual statistics holds true of pig iron production in September.

Pig Iron.—Easier conditions are in evidence and the market seems to have turned definitely although prices are not yet such as to make it attractive to automotive foundries for any but their immediate requirements. Some of the steel works have turned sellers of iron which helps in the downward readjustment of the market.

Aluminum.—European producers are offering virgin ingot aluminum, 98 to 99 per cent and 99 per cent plus, for November—December shipment at 15½ @ 15¾c., f.o.b. New York, duty to be paid by the buyer, which is the equivalent of about 21 @ 21¼c., delivered Middle West consuming point. Meanwhile there are still occasional sellers of warehouse metal at 20c., duty paid. One importer claims to have made a 50 ton sale for delivery over several months at an advance over what is commonly said to be domestic producer's price. Sheets are in active demand and the domestic producer is said to be behind on deliveries.

Copper.—The market is easy to feeble.

Calendar

SHOWS

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8 - 13 — New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 9 - 19 — Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

Dec. 15-Jan. 2 — Paris, Aeronautical Salon, Grand Palace. Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

May - July, 1923 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

CONVENTIONS

Oct. 18-20—Chicago, National Association of Farm Equipment Manufacturers, Congress Hotel.

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

Nov. 14 - 15 — Chicago, Semi-Annual Convention, Factory Service Managers, National Automobile Chamber of Commerce, La Salle Hotel.

Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

Jan. 29 - 31 — Chicago, Annual Meeting, Automobile Electric Association, Congress Hotel.

S. A. E. MEETINGS

Oct. 26-27 — Detroit, General Motors Building.

Jan. 9-12—New York, Annual Meeting.

Midgley Addresses S. A. E. Meeting in Indianapolis

INDIANAPOLIS, Oct. 16—The Indiana Section of the Society of Automotive Engineers held its first fall meeting last night and was addressed by Thomas Midgley, Jr., of the Dayton Engineering Laboratories, on the subject of combustion in automotive engines. Many automotive engineering men from over the State, as well as representatives of the local industries, were present.

With this first meeting of the fall series the Indiana section inaugurated a custom of inviting members of other engineering societies to the dinners and talks it schedules regularly. Members of the Heat Treating Society, of the Scientech Club, of the American Society of Mechanical Engineers and of the American Institute of Electrical Engineers were present.

Charles F. Kettering, who had been originally billed for the first meeting, being unable to attend, changed places with Midgley, who was scheduled for a later meeting.

Sales on Time Increase 100 Per Cent in Chicago

CHICAGO, Oct. 16—Increase of more than 100 per cent in the volume of business handled by the members of the Central Automobile Financing Association in the first ten months of this year as compared with the corresponding period last year was shown by the annual report submitted at the association's annual meeting.

In the first ten months of last year the number of motor vehicles financed was 17,591, and in the first ten months of this year the number was 39,308, an increase of 21,717. The association now has records of 99,000 motor vehicles financed by firms which are members of the association.

At the annual election Walter E. Heller of Walter E. Heller & Co. was re-elected president and C. L. Wolf of the Hamilton Investment Co. was re-elected secretary. Other officers chosen are: First vice-president, H. M. Hurst of Monroe Trust Co., Chicago; second vice-president, A. D. Barnes of American Banking Co., Springfield, Ill.; and treasurer, J. D. Purlee of Commercial Acceptance Trust.

New Car Registrations Total 5103 in New York

NEW YORK, Oct. 18—The seasonal decline in the metropolitan district is apparent in the registration figures for September as compiled by Sherlock & Arnold, publisher of the Automobile Sales Analysis, for the 10 counties in and around New York City. Total registrations for the month were 5103, as compared with 6438 in August and 8494 in July. For the first nine months of the year, registrations aggregated 59,613, as against 39,366 for the same period a year ago.

Four makes lead in the low and medium priced class field, with five falling not far behind and showing sales substantially greater than the remainder of this class. Ten cars in the high priced class are well ahead in the field.

A summary of registrations for the first nine months in the high, medium and low priced classes is as follows:

	High Price	Medium and Low Price
January	283	2016
February	273	2231
March	632	6354
April	862	8428
May	961	8470
June	865	8203
July	678	7816
August	516	5922
September	511	4592

PACKARD SERVICE CONFERENCE

DETROIT, Oct. 17—Packard service managers held a quarterly conference at the factory this week. Those attending were C. G. Culver and J. Minsenberger of Philadelphia, J. W. Floriday, Baltimore; B. R. Teckham, H. W. Ward, N. C. Rogers, J. E. Mills, Knox Brown, A. Mattison, F. E. Bishop and R. E. Rosen.

Business Paper Editors Confer in Joint Session

NEW YORK, Oct. 16—The National Conference of Business Paper Editors has held its annual meeting in this city in a joint session with the Associated Business Papers. Both organizations are national in scope and include in their membership all of the prominent business papers, among them AUTOMOTIVE INDUSTRIES.

The convention attracted international attention, England sending over five of her publishers and editors who were guests of the A. B. P. The visitors included F. E. Hamer of Benn Bros., Ltd., London; R. Child Bayley of Iliffe & Sons, Ltd., London; Ronald E. Dangerfield of Temple Press, London; Alfred Dawson of Percival Marshall & Co., London, and James Selkirk Allan of *Engineering* of London.

At the banquet of the A. B. P. international friendship was cemented when congratulatory letters were read from A. J. Balfour, Lord Riddle and half a dozen other British publishers.

Neal G. Adair, editor of *Motor World*, was elected a member of the executive board of the National Conference of Business Paper Editors.

Stewart-Warner Plants Employed to Capacity

CHICAGO, Oct. 17—Plants of the Stewart-Warner Speedometer Corp. are reported working at capacity with no accumulation of finished products. Orders which have been taken for two months in advance indicate that business will continue to be large. Railroad car shortage has not been felt because practically all requirements were anticipated and material was bought before the situation became severe and prices were advanced.

The company reports that the sale of bumpers has increased steadily and part of the plating work has had to be let to outside concerns. Carburetors are being manufactured in a small way as an experiment.